State of California
Regional Water Quality Control Board
Los Angeles Region

COMPREHENSIVE GROUND WATER MONITORING EVALUATION

OF THE

SOUTHERN CALIFORNIA CHEMICAL COMPANY

EPA ID NO. CAD008488025

3 June 1988

(revised 15 June 1988)

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION
107 South Broadway, Room 4027
Los Angeles, California 90012

Comprehensive Ground Water Monitoring Evaluation
FY 87-88

FACILITY:	Southern California Chemical Co. 8851 Dice Road Santa Fe Springs, CA 90620
EPA ID NO.:	CAD008488025
DATES OF INSPECTION:	2-4 February 1988
TYPE OF INSPECTION:	CME
TASK FORCE MEMBERS:	Brian Lewis, DHS Headquarters David Schwartzbart, DHS Regional Bill Levine, SWRCB
DATE OF REPORT:	3 June 1988
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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1.0 CERTIFICATION

On 2-4 February 1988, Athar Khan, Sanitary Engineering Associate with the California Regional Water Quality Control Board, Los Angeles Region, made a RCRA Comprehensive Ground Water Monitoring Evaluation (CME) field inspection of the ground water monitoring program at Southern California Chemical Company. The CME also included a review of the facility file, quarterly monitoring reports of ground water quality, and geological reports prepared by J. H. Kleinfelder & Associates.

Also accompanying on the site inspection were members of the CME Task Force: Brian Lewis, DHS Headquarters and Bill Levine, State Water Resource Control Board (SWRCB). In addition, Nancy Ball, Hazardous Materials Laboratory-Berkeley, assisted with the sampling audit.

This report includes a brief description of the facility, the geology and hydrogeology of the area, the ground water quality, and the ground water monitoring system at the facility. The report also includes copies of DHS checklists with reviewer comments about the adequacy of the monitoring system.Some changes and modifications to the original draft report, by Athar Kahn, were done by Jennifer S. Schroll, Engineering Geologist with the Regional Water Quality Control Board, Los Angeles. Technical review of the CME report was provided by the CME Task Force and Michael E. Taweel, Jr.

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2.0 EXECUTIVE SUMMARY

2.1 Introduction

On behalf of the California Department of Health Services (DHS), Regional Water Quality Control Board (RWQCB) staff conducted a Comprehensive Ground Water Monitoring Evaluation (CME) of the ground water monitoring program at Southern California Chemical Company facility in Santa Fe Springs (Figure 1). The RWQCB was assisted in this CME by Interagency CME Task Force members, Brian Lewis, DHS Headquarters; David Schwartzbart, DHS Regional Office; and Bill Levine, SWRCB, as per the 1987-1988 Interagency Agreement between DHS and SWRCB. Nancy Ball, Hazardous Materials Laboratory, Berkely, assisted with the sampling audit.

The objective of this CME was to evaluate the ground water monitoring program at Southern California Chemical Company for compliance with the Resource Conservation and Recovery Act (RCRA) interim status requirements specified in 40 CFR Parts 265.90, 265.91, 265.92, 265.93, 265.94, and 270.14. This CME will also aid in evaluating Southern California Chemical Company Closure Plan for RCRA compliance.

On January 20, 1988, a preinspection meeting of DHS Task Force members and RWQCB staff was held. At this meeting, numerous items were discussed, such as regulatory history, site-specific conditions, onsite health and safety, duty requirements, and Appendix A. On February 2, 1988, site inspectors met with the owner/operator at the facility, reviewed facility records, and measured water levels. The visual site inspection occurred the next day, at which time ground water sampling procedures were observed. A post-inspection meeting of regulatory agency staff and facility representatives took place on February 4, 1988, to review the history and development of the ground water monitoring system.

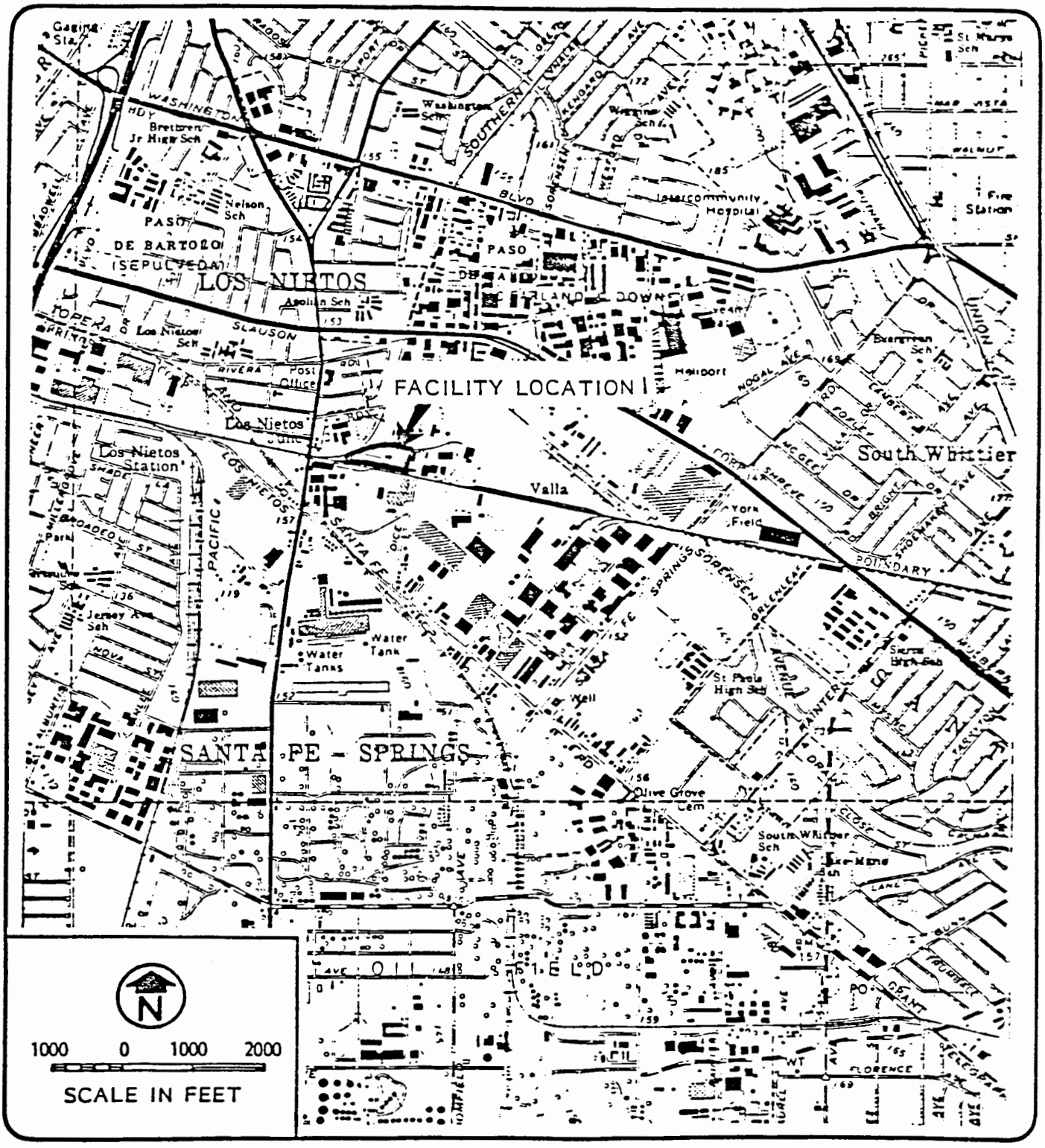


Figure 1

SITE LOCATION OF SOUTHERN CALIFORNIA CHEMICAL CO.
SANTA FE SPRINGS FACILITY

2.2 Facility Background

Since 1958, the facility has been used to manufacture ferric chloride solutions, copper sulfate solutions, copper oxides, and etchants (including a line of proprietary ammoniacal etchants patented by the owner/operator). These chemicals are manufactured from raw materials, spent etchants, caustics, and acids. During the manufacture of the copper oxides and certain other products, alkaline wastewater is generated. However, records regarding facility processes and manufacturing areas are extremely confusing; it appears that the owner/operator has changed processes many times and equipment has often been moved around the property resulting in the presence of various potential sources of contamination.

Between 1975 and 1985, process wastewater from various portions of the facility was collected and treated in a 36,000-gallon waste management unit referred to as Pond 1. Pond 1 is the only designated RCRA unit, although there are several solid waste management units (SWMU's) that are regulated per the 1984 RCRA amendments. The location of this surface impoundment is shown in Figure 2. According to the owner/operator, Pond 1 was constructed above an existing concrete pond used to collect zinc sulfate wastewater. Pond 1 was constructed with six inch steel reinforced concrete two feet above grade and one foot below grade.

Company records indicate that the contents of the surface impoundment varied only slightly during the ten years of operation (Table 1). Although the pH of the wastewater was generally basic, the type of chemical used for treatment depended on the characteristics of the waste. Under permit from the County Sanitation Districts of Los Angeles County, neutralized effluent was then discharged into the sanitary sewer system through a four-inch underground pipeline. Precipitated sludges at the bottom of the surface impoundment were either pumped out periodically and routed through a filter press, or removed and hauled to a Class I disposal site.

TABLE 1

CHEMICALS USED IN POND 1

Ammonium chloride
Ammonium sulfate solution
Free ammonium
Chrome sulfide
Chromic-sulfuric acid solution
Copper ammonium chloride solution
Copper sulfide
Ferrous hydroxide solution
Iron sulfide
Lead sulfide
Nickel sulfide
Sodium chloride solution
Sodium sulfate solution
Sulfuric acid solution
Zinc sulfide

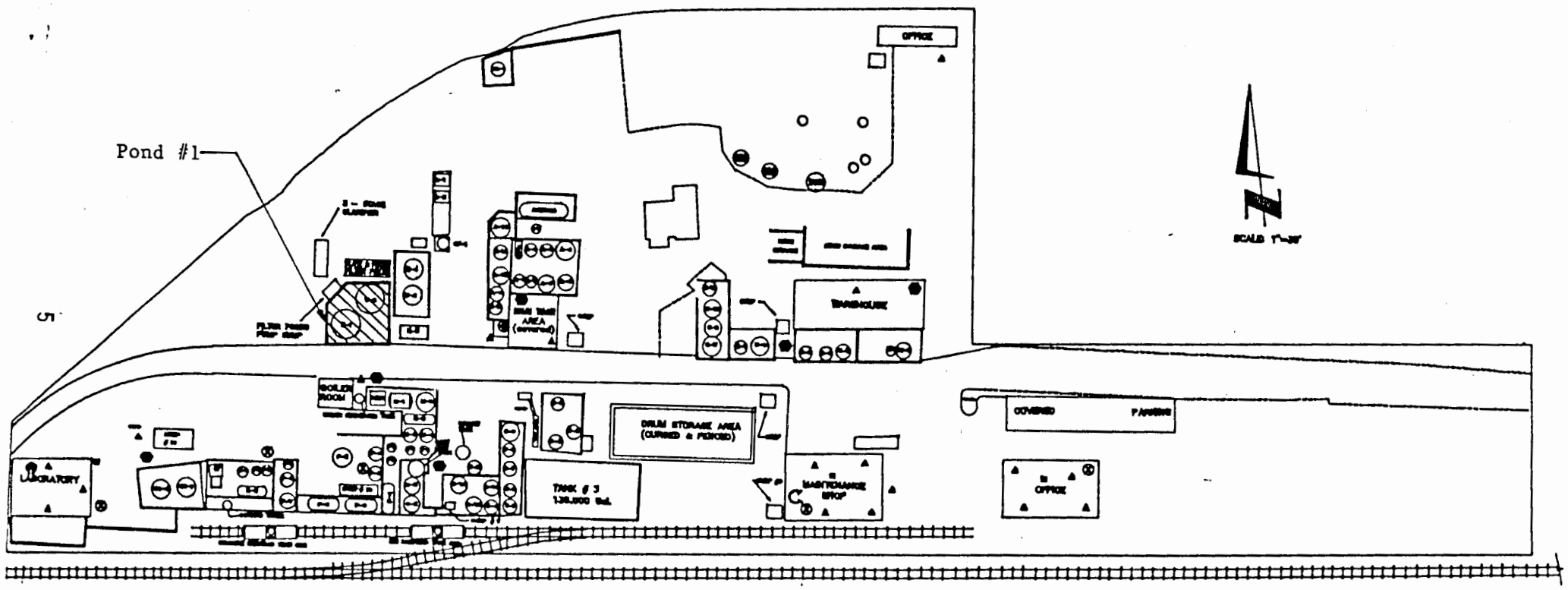


Figure 2 SITE PLAN
SOUTHERN CALIFORNIA CHEMICAL Co.

On May 8, 1985, the U. S. Environmental Protection Agency (EPA) made a formal request for Part B of the application filed by the owner/operator for a hazardous waste facility permit under the Resource Conservation and Recovery Act. However, in July 1985, the surface impoundment was taken out of service and replaced with two 30,000-gallon fiberglass-reinforced plastic tanks. (Since that time, the former surface impoundment has been intended to provide secondary containment for these above-ground tanks.) It should be noted that this change of status was made without an approved closure plan. In fact, the first of two closure plans [11] was not received until July 30, 1985 after closure had been started. In March, 1986 the Regional Board informed DHS that the closure plan was inadequate. Included in these comments, RWQCB staff informed DHS that the owner/operator would have to submit a revised closure plan which contained information on post-closure maintenance pursuant to Section 13227 of the California Water Code. In October, 1987 a second closure plan [12] was submitted. On December 30, 1987 DHS issued a Notice of Deficiency (NOD). In April 1988 DHS, EPA, and RWQCB staff held a meeting to discuss a strategy for closure of Pond 1. DHS staff agreed to send a letter to Southern California Chemical Company, as an addition to the December, 1987 NOD, advising them of the closure strategy and asking for submittal of a revised closure plan based on this strategy.

2.3 Summary of Ground Water Monitoring System

Following is a summary of potential deficiencies of the ground water monitoring program at Southern California Chemical Company. Deficiencies are discussed within the Appendix A checklist and review comments. Specific technical inadequacies of the ground water investigation and monitoring system at the facility, which may constitute RCRA violations under 40 CFR 265.90, 265.91, 265.92, and 270.14, are listed below. Some of the technical inadequacies may be deficiencies in meeting professional performance standards in performing a complete professional hydrogeological assessment of a hazardous waste facility and do not necessarily constitute violations. The capitalized headings represent ground water performance standards for RCRA facilities that correspond tc the cited code of the Federal Register:

40 CFR 270.14(c)(2); 40 CFR 265.90(a):
THE UPPERMOST AQUIFER MUST BE CORRECTLY IDENTIFIED

1. The uppermost aquifer has not been adequately defined. Data has been presented by the owner/operator suggesting that the Gage and/or the Jefferson Aquifer may be the uppermost aquifer(s). Potential interconnections of these units have not been adequately investigated and reported.

2. The geologic consultant for SCCC incorrectly used a regional cross section taken from DWR Bulletin 104 [2] that does not apply to this site. In addition, the consultant mislocated the site on this cross section and as a result, has

misidentified the subsurface stratigraphy. Specifically, the uppermost water bearing aquifer, as defined by the consultant, should be the Hollydale Aquifer not the Jefferson Aquifer.

3. Characterization of the geology and hydrogeology underlying the site is incomplete and inadequate. Stratigraphy, lithology, structure, and primary and secondary permeability are some of the factors that have not been adequately addressed. Submitted reports lack adequate site specific geologic maps, topographic maps, and cross sections. Submitted reports also do not reflect the current physical status of the facility structures and grounds. These data must be provided to adequately characterize the subsurface stratigraphy and identify the uppermost aquifer.

40 CFR 270.14(c)(2):
HYDRAULIC INTERCONNECTION BETWEEN AQUIFERS MUST BE DETERMINED

4. The degree of hydraulic interconnection between the uppermost aquifer and any underlying or adjacent aquifer should be determined. The presence or absence of a reported confining layer above and below the Hollydale Aquifer should be confirmed.

40 CFR 270.14(c)(2):
GROUND WATER FLOW PATHS, DIRECTIONS, AND VELOCITIES MUST BE PROPERLY DETERMINED

5. Velocities have not been calculated by the owner/operator. In addition, vertical ground water gradients have not been adequately determined.

6. Effects of local pumping and/or discharge needs to be investigated.

40 CFR 265.91(a)(1):
BACKGROUND WELLS MUST BE LOCATED SO AS TO YIELD SAMPLES THAT ARE NOT AFFECTED BY THE FACILITY

7. The owner/operator has not demonstrated that there are upgradient monitoring wells in sufficient numbers, locations, and depths to yield ground water samples that are (1) representative of background ground water quality in the uppermost aquifer near the facility, and (2) not affected by the facility. The hydrogeology of the uppermost aquifer has not been characterized.

40 CFR 265.91(a)(2):
DOWNGRADIENT MONITORING WELLS MUST BE LOCATED SO AS TO ENSURE THE IMMEDIATE DETECTION OF ANY CONTAMINANT MIGRATING FROM THE FACILITY

8. The owner/operator has not demonstrated that there are downgradient monitoring wells in sufficient numbers, locations and depths to yield ground water samples that are representative of water quality in the uppermost aquifer. The vertical gradient may be sufficiently steep at the downgradient area that additional wells with deeper screens will be required.

40 CFR 265.91(c):
MONITORING WELLS MUST BE CONSTRUCTED SO AS TO YIELD SAMPLES THAT REPRESENT UPGRADIENT AND DOWNGRADIENT WATER QUALITY

9. The owner/operator has not demonstrated that there are monitoring wells in sufficient number, location, and depth to yield representative ground water samples.

10. Well construction deficiencies:

- improper placement of well screen intervals
- improper placement of filter pack in relation to well screen
- caved materials in screen intervals
- improper seals
- improper well caps
- improper determination of filter pack and screen slot sizes

40 CFR 265.92(a):
A GROUND WATER SAMPLING AND ANALYSIS PLAN MUST BE DEVELOPED AND FOLLOWED

11. The owner/operator has submitted an inadequate sampling and analysis plan. Contained within the Work Plan [7] appendices, the sampling and analysis plan says only that "sampling methods will be in accordance with 14th Edition of Standard Methods."

12. Some inadequacies noted during inspection:

- There is no sampling schedule
- The sample collection-pump rate is not specified
- Details for filling sample containers from the pump stream to avoid aeration are not specified
- There are no specifications for adding preservatives
- There are no labeling instruction
- A bound log book must be used for recording all field data and observations, rather than loose sheets of paper

- There are no analytical procedures or detection limits specified
- Inadequate meter calibration
- There are no provisions to check for floaters and sinkers
- Inadequate decontamination procedures and sampling cleanliness
- There are no specified lab procedures
- Some samples taken were observed to be turbid
- Head space was observed in TOX and TOC sample vials

40 CFR 270.14(c)(4):
ANY PLUME OF CONTAMINATION THAT HAS ENTERED THE GROUND WATER FROM A REGULATED UNIT MUST BE DESCRIBED

13. No determination of the extent and rate of migration of the contaminant plume(s) has been made.

3.0 TECHNICAL REPORT

3.1 Environmental Setting

The facility is located in the Santa Fe Springs Plain, part of the Coastal Plain of Los Angeles County. The Santa Fe Springs Plain is an alluvial plain located northwest of an anticlinal feature in Coyote Hills. The surface exposure at Southern California Chemical Company is the Lakewood Formation comprised of upper Pleistocene stream and flood plain deposits. The Lakewood Formation (containing the Gage Aquifer) unconformably overlies the San Pedro Formation, which contains the Hollydale, the Jefferson, the Silverado, and the Sunnyside Aquifers in increasing depth order [2].

According to the facility consultant, average annual rainfall for the area is approximately 13 to 14 inches. The Sorenson Avenue flood control channel, which is located approximately 0.25 mile northeast to the facility, is the only surface water feature within a one-mile radius of the facility. The San Gabriel River is slightly over one mile west of the facility. The associated recharge basins are located 1.5 to 2.0 miles northeast of the facility. Streams in this area are intermittent due to the semi-arid climate of southern California.

3.2 Geology and Hydrogeology

The stratigraphy beneath the facility begins with fine-grained sediments of the Bellflower Aquiclude, the least permeable portion of the Lakewood Formation. This aquitard, which ranges from 5 to 15 feet thick, consists of gravelly clays, silts, silty clays, and sandy clays [9].

The lower portion of the Lakewood Formation is the Gage Aquifer, a fine to medium sand unit approximately 20 feet thick. Soil borings at the facility suggest that the base of the Gage Aquifer occurs at an average depth of 30 feet [2].

The San Pedro Formation, comprised of lower Pleistocene deposits, unconformably underlies the Lakewood Formation. The uppermost layer of the San Pedro Formation is an aquitard comprised of clayey silts and silty clays. This aquitard ranges from 5 to 30 feet thick at the facility and separates the Gage Aquifer from the Hollydale Aquifer [2].

The Hollydale Aquifer is encountered at an average depth of approximately 60 feet beneath the facility and extends to 100 feet below the facility where another thin aquitard is encountered [2].

The regional ground water gradient in both the Gage and Hollydale Aquifers is to the southwest. Figure 3 is the most recent ground water elevation map prepared by J. H. Kleinfelder & Associates

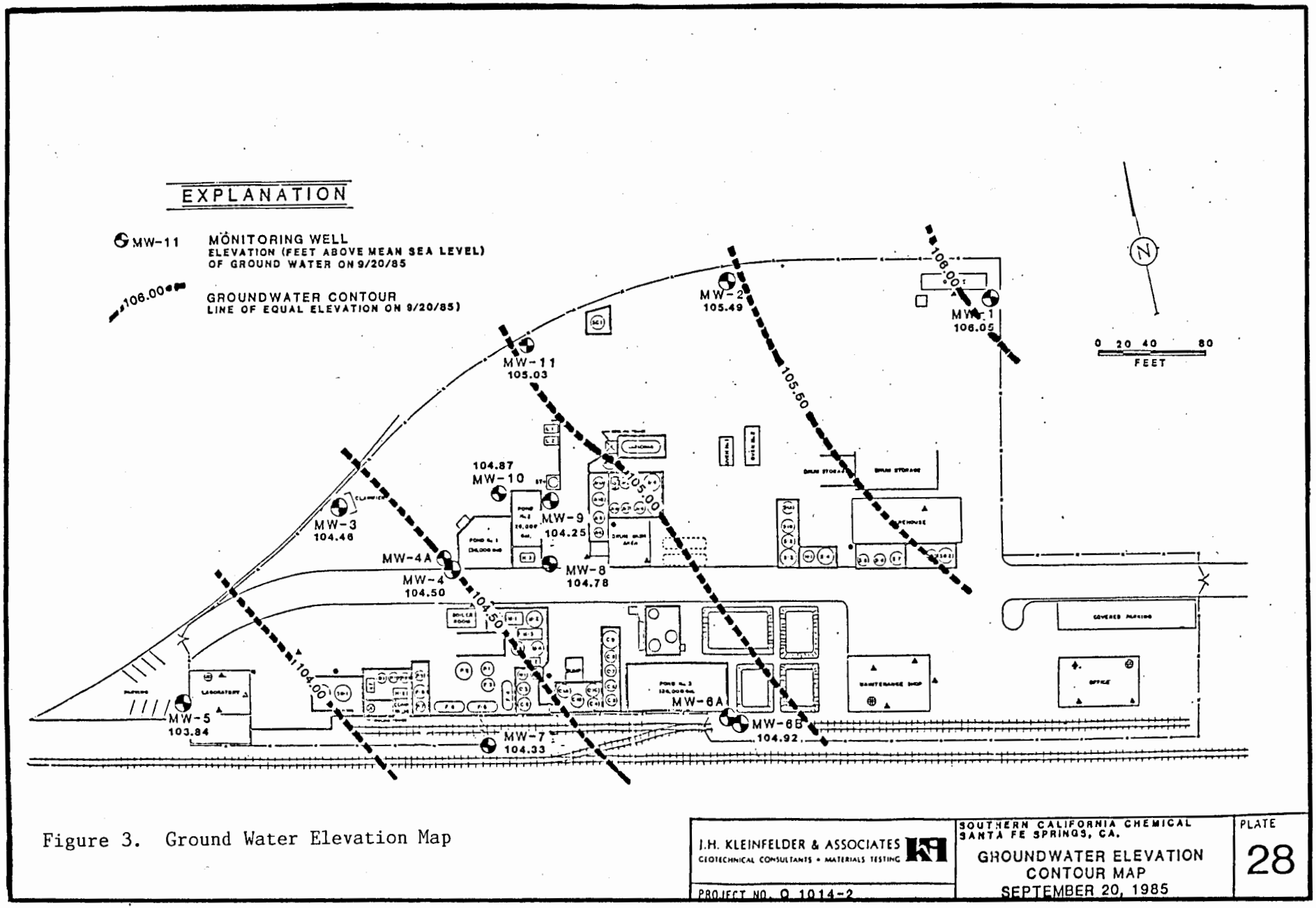


Figure 3. Ground Water Elevation Map

J.H. KLEINFELDER & ASSOCIATES GEOTECHNICAL CONSULTANTS • MATERIALS TESTING PROJECT NO. Q 1014-2	SOUTHERN CALIFORNIA CHEMICAL SANTA FE SPRINGS, CA. GROUNDWATER ELEVATION CONTOUR MAP SEPTEMBER 20, 1985	PLATE 28

[9]. Figure 4 is a ground water elevation map prepared by the CME Task Force. Depth to ground water measurements taken during the visual site inspection and used to generate the Task Force map are included in Table 2. These data tend to confirm that the ground water gradient is toward the southwest.

TABLE 2

Southern California Chemical Company
CME Evaluation of Ground Water Monitoring Wells
3 February 1988

Well #	Datum (MSL) (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
1	152.62	52.49	100.13
2	151.56	52.32	99.24
3	151.62	53.40	98.22
4	149.76	51.55	98.21
4A	152.49	54.02	98.47
5	153.21	55.69	97.52
6A	149.31	dry	dry
6B	149.46	51.02	98.44
7	149.27	51.35	97.92
8	149.53	51.34	98.19
9	151.14	52.29	98.85
10	151.60	52.91	98.69
11	152.80	53.83	98.97

According to the facility consultant, there are four production wells (2S/11W-29E05, 2S/11W-30Q05, 2S/11W-30R03, and 3S/11W-32J04) located within a one mile radius of the facility that may be affecting the local gradient. No other information about these wells was provided.

Table 3 is taken from "Environmental Assessment" [9] and contains historical ground water elevation data.

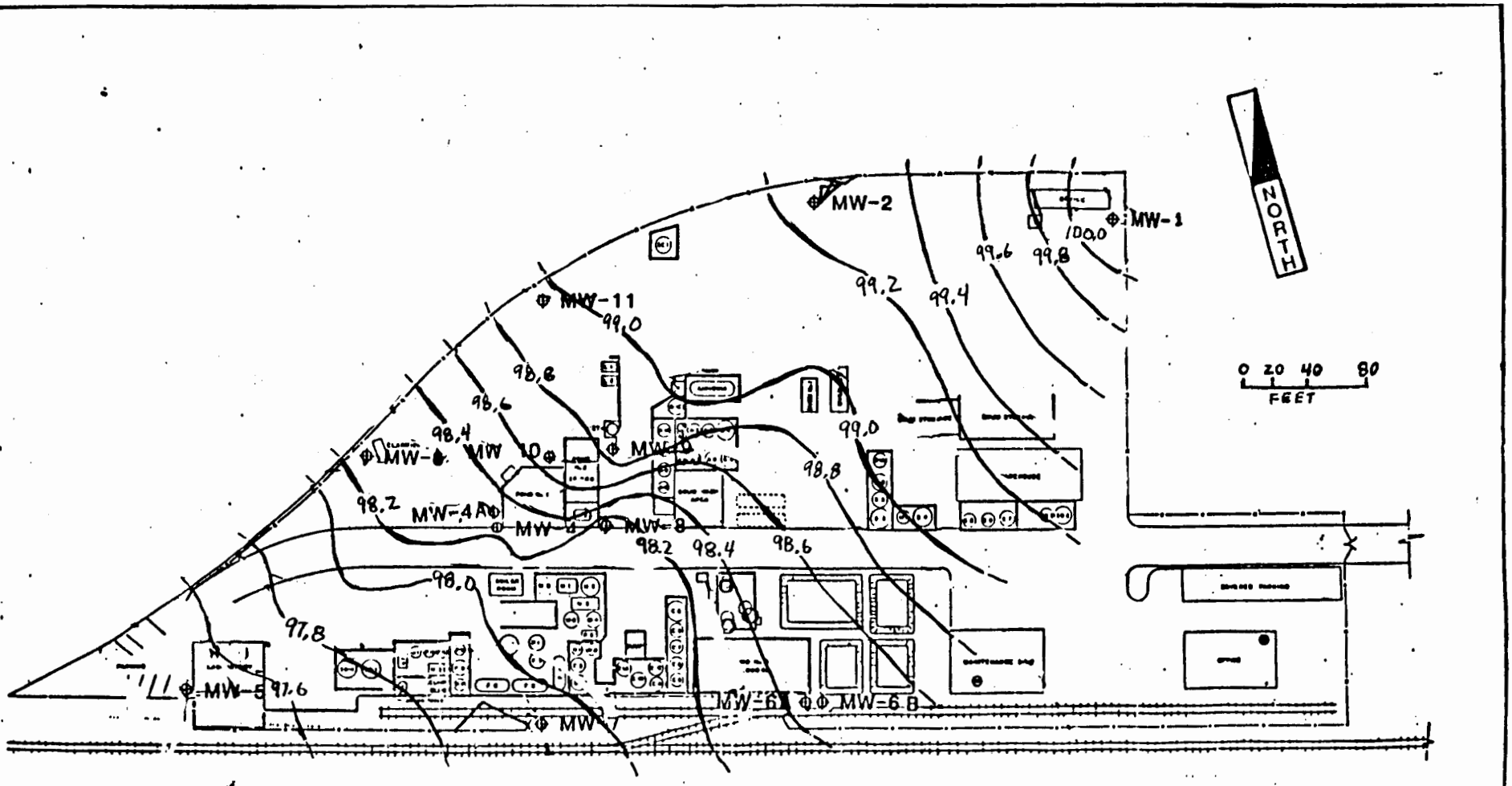


Figure 4 CME TASK FORCE GROUNDWATER CONTOUR MAP
Based on water levels taken on 2/3/88
Data from MW-4A not considered
CI=.2 feet
Elevations are in Feet Above Mean Sea Level

TABLE 3

GROUND WATER LEVEL ELEVATIONS
(feet MSL)

Well #	Well Depth	2-22-85 3-12-85	4-09-85	7-24-85 8-05-85	8-19-85	9-20-85	3-19-86	7-09-86	9-24-86	12-17-86	3-31-87	7-01-87	10-17-87
1	62.5	108.49	108.48	109.66	108.16	106.05	103.40	107.78	105.15	103.85	103.71	103.57	100.09
2	75.0	107.31	107.72	109.21	107.56	105.49	102.44	107.04	104.05	102.96	106.58	103.95	98.85
3	75.0	106.37	107.52	108.37	106.65	104.46	101.22	106.03	103.15	102.07	102.96	101.87	97.77
4	75.0	105.76	108.11	108.36	105.16	104.50	101.42	105.94	102.98	101.81	101.78	102.95	97.76
4A	107.0			108.84	109.43	104.49	102.67	107.29	104.29	102.09		104.19	98.92
5	75.0	105.71	106.02	107.68	106.03	103.84	100.46	105.40	102.49	101.41	101.37	98.51	96.24
6A	30.0		119.39		120.91								
6B	77.5	106.46	106.80		107.81	104.92	101.48	106.02	103.21	102.16	101.95	103.11	98.28
7	75.0			107.48	105.34	104.33	101.07	105.73	102.63	101.57	101.52	99.20	97.75
8	71.0			107.95	106.86	104.78	101.65	106.26	103.17	101.98	101.68	101.52	98.12
9	77.0			108.35	106.98	104.25	102.14	106.72	103.64	102.74	104.02	103.53	98.56
10	75.0			107.88	106.94	104.87	102.80	106.26	103.15	102.40	102.62	102.14	98.01
11	75.5			108.38	107.17	105.03	101.96	106.61	103.34	102.65	102.91	102.41	98.21

Taken from "Environmental Assessment" [9]

3.2.1 Well Development and Pumping Tests

To date, three separate proposals/workplans have been submitted by J. H. Kleinfelder & Associates [4, 5, 7]. In each document, the consultant consistently states that newly installed ground water monitoring wells "will be developed by . . . either pumping, bailing, or air lift with a foot valve at the bottom of the intake line to avoid introducing air into the aquifer." This statement is misleading since the consultant has relied exclusively on air lifting for well development [6, 8, 9]. Pumping and/or bailing has not been used.

On August 19, 1985, a step drawdown test was performed on MW-9 to observe the relationship between pumping rate and drawdown to help determine proper pumping rates for a subsequent aquifer test. A 2 H.P. Goulds submersible pump (Model UTM20412), which was set at a depth of 65 feet, was pumped at rates between 21 and 38 gallons per minute (gpm) for 110 minutes. Drawdown in MW-9 was monitored with a wire line (conductivity-based) water level indicator. A rotometer was used to monitor discharge from the pump. Appendix C contains all data obtained from this test.

On August 29, 1985, a constant discharge test was performed on MW-9; MW-4, MW-8, and MW-10 were used as observation wells. Although the proposal by J. H. Kleinfelder & Associates [6] states that the test would be conducted for 24 hours, pumping (at 25.4 gpm) was terminated after 4 hours, 10 minutes because "the discharge started to decrease due to the increasing head in the storage tank and as a result of the pump overheating." The consultant states that this was enough time to achieve near steady state conditions. SWRCB staff attempted to plot the pump test data, but concluded that there were not enough points to determine a graphical analysis.

The plotted time-drawdown data from MW-4, MW-8, and MW-10 were analyzed by Theis curve matching and Jacob-Cooper approximation. On the basis of the calculated storage coefficients (0.0061 to 0.018), owner/operator's consultant concluded that the wells are screened in a confined aquifer. The Task Force has also plotted this data and has concluded that this is not evidence of a confined aquifer; the values are too high for a confined aquifer.

3.3 Ground Water Monitoring System

On May 18, 1984, RWQCB staff requested information from the owner/operator concerning the status of ground water monitoring at the facility. Shortly thereafter, both the RWQCB and DHS were informed by the owner/operator that the facility had not installed a ground water monitoring system, although nearly 3 years had passed since DHS issued an ISD [1]. However, in response to the RWQCB inquiry letter, the owner/operator agreed to submit a proposal to bring the facility into compliance.

On July 2, 1984, the owner/operator submitted the requested proposal [4] to the RWQCB for review and approval. However, this proposal was no more than a modified version of an earlier plan prepared by J. H. Kleinfelder & Associates for the installation of an underground storage tank monitoring system.

Nevertheless, joint RWQCB/DHS comments on the proposal were sent to the owner/operator in September 1984. In response, a more detailed proposal [5] for the installation of four ground water monitoring wells was submitted on November 28, 1984. This so-called "revised" proposal was conditionally approved by the RWQCB Executive Officer on December 11, 1984. One of the conditions imposed by the RWQCB was the installation of three additional monitoring wells.

As of this date 13 monitoring wells are in place; however the number, location, and depth of these wells is inadequate to determine the extent of contamination from Pond 1.

3.3.1 Detection Monitoring System

During January 1985, the following seven (7) ground water monitoring wells were installed for detection monitoring purposes:

Well Number	Drilling Period	Depth of Borehole	Depth of Well
MW-1	01/07-08/85	80.0	62.5
MW-2	01/10-18/85	95.0	75.0
MW-3	01/16-21/85	75.0	75.0
MW-4	01/16-22/85	75.0	75.0
MW-5	01/15-21/85	75.0	75.0
MW-6A	01/16-22/85	45.0	30.0
MW-6B	01/22-22/85	80.0	77.5

Both MW-1 and MW-2 were installed as upgradient monitoring wells: MW-1 is located approximately 450 feet upgradient of the surface impoundment at the northeastern corner of the facility; MW-2 is located approximately 350 feet northeast of the surface impoundment along the northern boundary of the facility. According to facility representatives, MW-3 was installed to obtain water quality data near the location of sewer leaks which have occurred at the facility. MW-4 was placed immediately downgradient of Pond 1 to detect any leaks. MW-5 was installed as a downgradient well at the extreme southwest corner of the property adjacent to the facility laboratory. Also according to facility representatives, MW-6A was installed to obtain ground water quality data near two former copper-sulphate ponds. MW-6B was installed to determine the amount of chemical attenuation through the 15-foot clay zone beneath the Gage Aquifer.

On June 13, 1985, the owner/operator submitted a report [6] describing the installation of the ground water monitoring system. On the basis of analytical results presented in the report, the consultant recommended the implementation of a ground water quality assessment program.

3.3.2 Assessment Monitoring System

On June 14, 1985, the owner/operator submitted an undated work plan [7] to install an assessment monitoring system.

Well Number	Drilling Period	Depth of Borehole	Depth of Well
MW-4A	07/10-XX/85	110.0	107.0
MW-7	07/08-XX/85	75.0	75.0
MW-8	07/12-XX/85	75.0	71.0
MW-9	07/10-XX/85	77.0	77.0
MW-10	07/10-XX/85	75.0	75.0
MW-11	07/08-XX/85	76.5	75.5

MW-11 was located approximately 200 feet north of the surface impoundment and approximately 150 feet west of the MW-2. According to the facility this well represents a third background water quality well. MW-4A was installed as a deep well immediately downgradient of the surface impoundment in an effort to define the vertical extent of the contamination. MW-7 was installed along the southern boundary of the facility to determine whether off-site migration was occurring. MW-8 was installed to define the horizontal extent of contamination near the surface impoundment in relation to other possible sources of contamination, including nearby underground storage tanks. MW-9 and MW-10 were installed near an abandoned underground sump which was reportedly located at the center of the facility.

Figure 5 shows the locations of the 13 existing ground water monitoring wells.

3.3.3 Well System

In the approved proposal by J. H. Kleinfelder & Associates [6], the first six boreholes were to be drilled with a truck-mounted, continuous-flight, hollow stem auger either to the base of the Gage Aquifer or 20 feet into ground water. Alleged difficulties during drilling brought about a modification to this procedure in which drilling deeper than 45 feet at <u>all</u> wells was supposedly done with mud rotary equipment. However, available information suggests that the following sequence of events actually took place:

MW-1 - drilled to 80' with 8" HSA/redrilled to 80' with 10" HSA
MW-2 - drilled to 95' with 8" HSA
MW-5 - drilled to 75' with 8" HSA

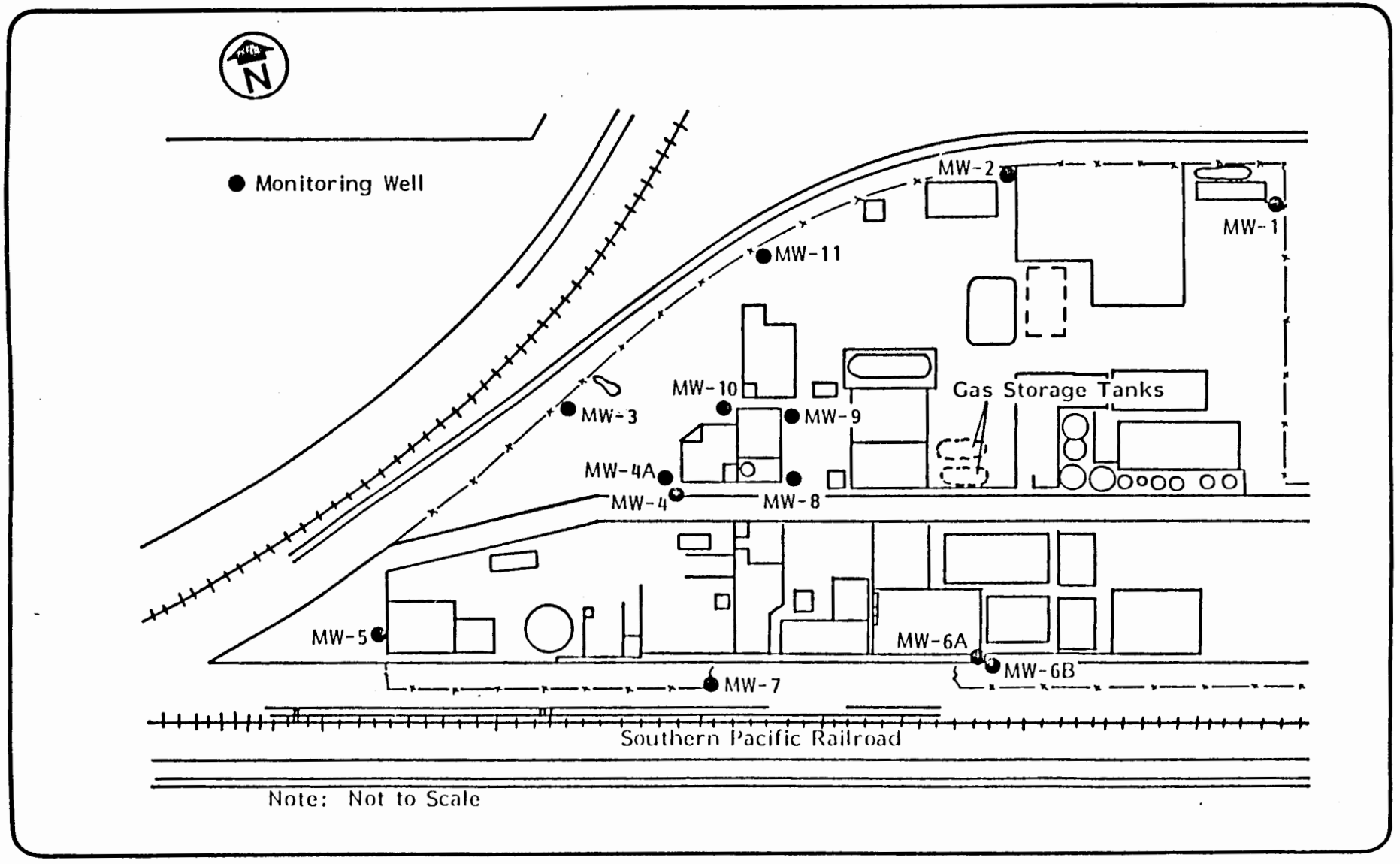


Figure 3. LOCATIONS OF MONITORING WELLS AT SOUTHERN CALIFORNIA CHEMICAL, INC.

MW-3 - drilled to 75' with 8" HSA
MW-4 - drilled to 75' with 8" HSA
MW-6A - drilled to 45' with 8" HSA
MW-2 - redrilled to 75' with 7-5/8" rotary equipment
MW-6B - drilled from surface to 80' with 7-5/8" rotary equipment

MW-7 - drilled to 75' with 8" HSA
MW-11 - drilled to 76.5' with 8" HSA?
MW-9 - drilled to 77' with 8" HSA? (4" well)
MW-10 - drilled to 75' with 8" HSA?
MW-4A - drilled to 110' with 8" HSA? (4" well)
MW-8 - drilled to 75' with 6" HSA

HSA? - The drill logs did not specify what type of drilling equipment was used to drill these bore holes.

Appendix D contains copies of 13 lithologic logs drafted by the consultant subsequent to drilling (in some cases, these logs were not drafted until five months after drilling). Copies of the boring logs actually prepared in the field can be found in the final "environmental assessment" report submitted by J. H. Kleinfelder & Associates [9].

Prior to any on-site drilling, the ground water monitoring wells were "designed" by J. H. Kleinfelder & Associates [5] on the basis of the company's "considerable work with the Gage Aquifer in the local area." (Emphasis added) Kleinfelder further states that "optimum well design for 2-inch monitoring wells consists of 0.020 inch factory slotted well screen and a No. 3 to No. 20 mesh sand ("Monterey Sand") filter pack." [5] No documentation is provided to substantiate that the hydrogeologic characteristics of the Gage Aquifer can be used to design monitoring wells installed in any other aquifer (12 of the 13 wells were completed in another aquifer). No mention is made of the "design" criteria for the two 4-inch monitoring wells (i.e., MW-4A and MW-9).

J. H. Kleinfelder & Associates has submitted several different "well configuration" diagrams as examples of how monitoring wells are constructed by the company. Of the 13 ground water monitoring wells, 11 are 2-inch diameter wells (Figure 6) and two are 4-inch diameter wells (Figure 7). However, the original drill logs indicate that none of the wells were constructed according to the "typical" well construction diagram, as explained below:

1. Two feet of "blank PVC section", a sediment trap, was not used at the bottom of each well.

2. Two of the 2-inch diameter wells were not constructed in an 8-inch borehole (MW-1 and MW-8).

3. Neither of the two 4-inch diameter wells were constructed in a 10-inch borehole (MW-4A and MW-9).

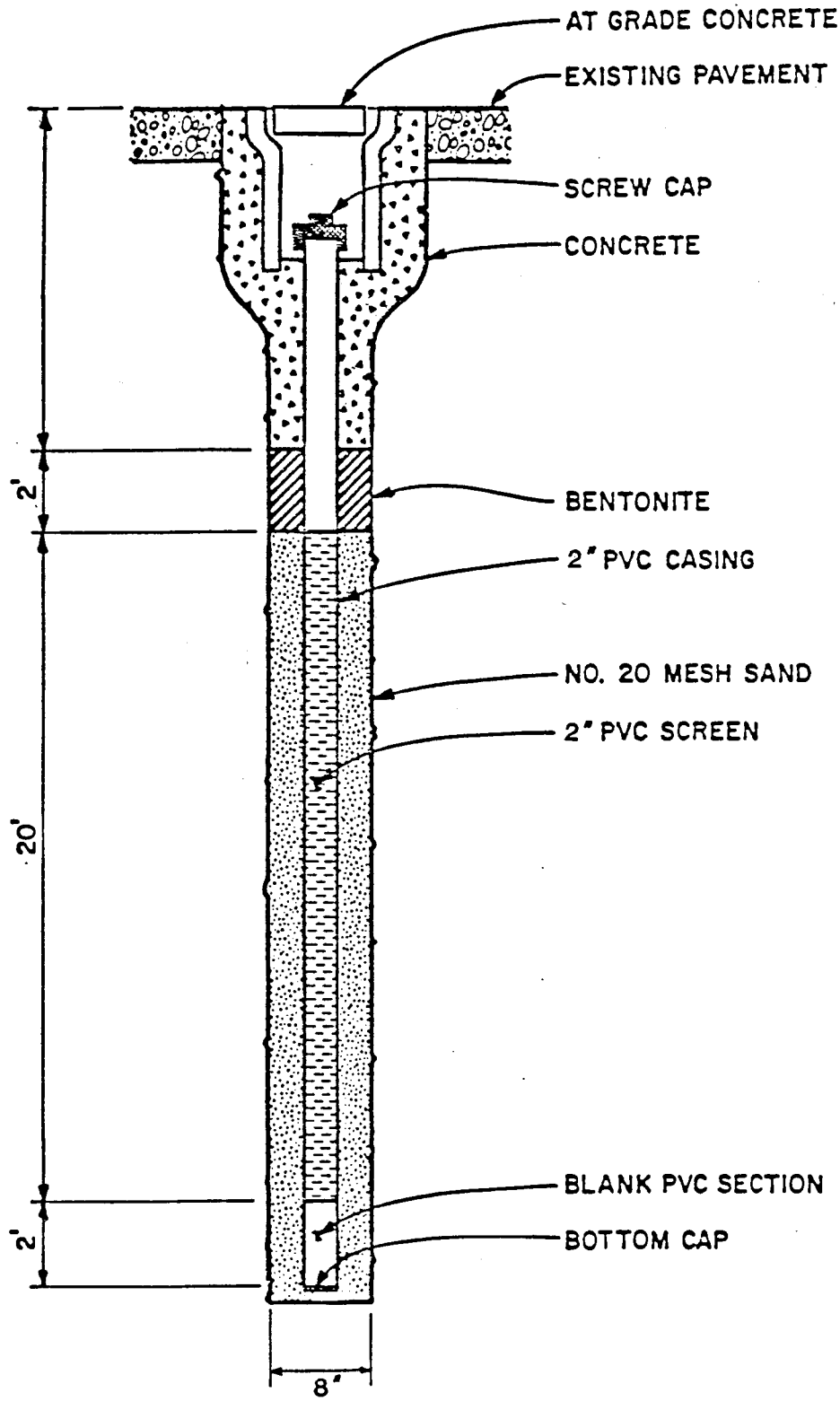


Figure 6

J.H. KLEINFELDER & ASSOCIATES GEOTECHNICAL CONSULTANTS • MATERIALS TESTING	2" PVC MONITORING WELL TYPICAL WELL CONFIGURATION	PLATE 3
PREPARED BY: DATE:		
CHECKED BY: DATE:	PROJECT NO.	

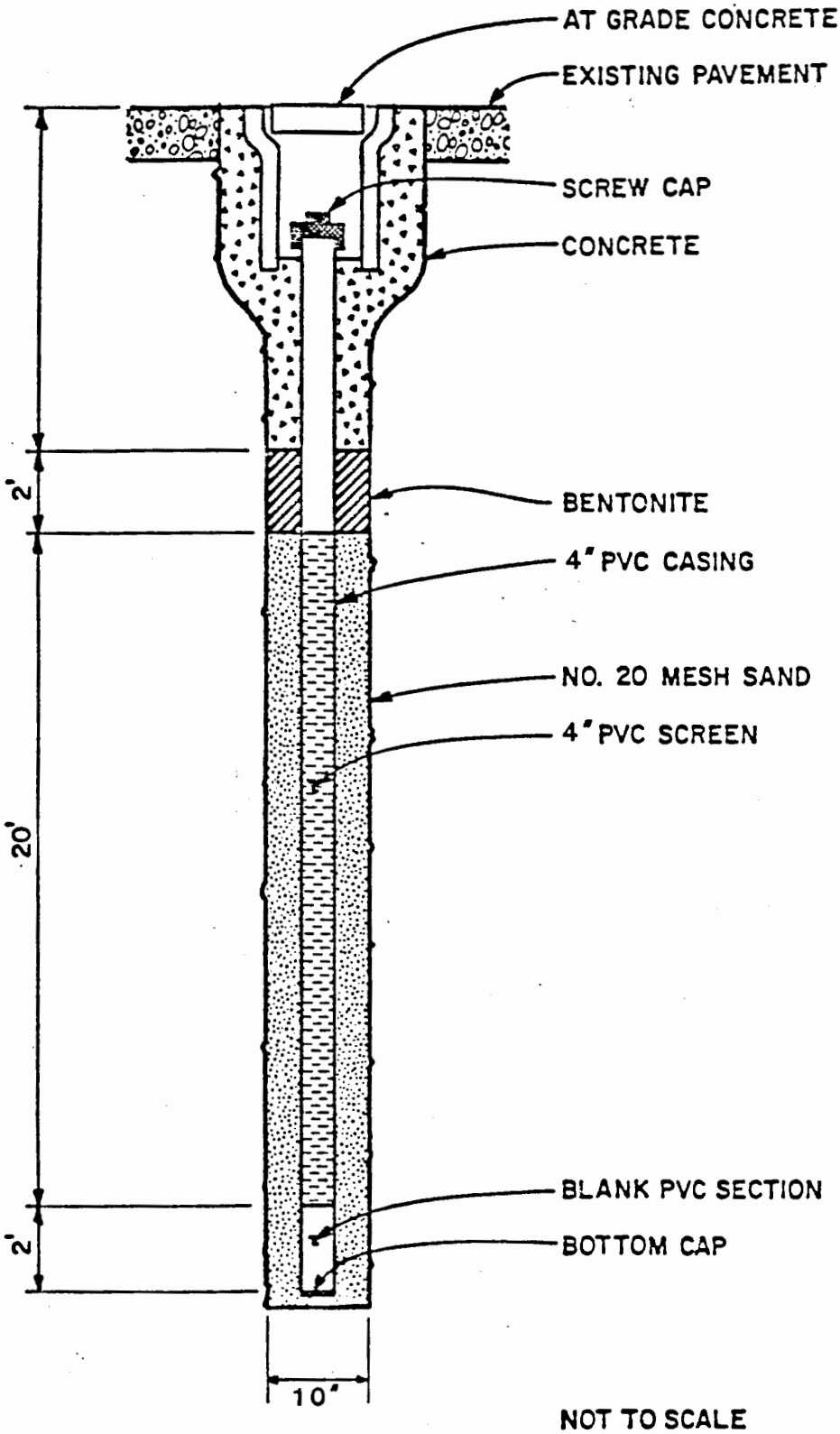


Figure 7

J.H. KLEINFELDER & ASSOCIATES GEOTECHNICAL CONSULTANTS • MATERIALS TESTING	4" PVC MONITORING WELL TYPICAL WELL CONFIGURATION	PLATE 4
PREPARED BY: DATE:		
CHECKED BY: DATE:	PROJECT NO.	

4. None of the wells were constructed so that the top of the filter pack would coincide with the top of the well screen (Table 4).

5. Only four of the wells have 20 feet of screen (MW-1, MW-4A, MW-6A, MW-11), all other wells have 30 feet of screen.

6. Two of the wells have a 1-foot bentonite seal (MW-1, MW-9), MW-8 has a 3-foot "clay" seal, and MW-11 has a 2-foot "clay" seal. MW-4A has no seal (Table 4).

Table 4

Well Screen vs. Sand Pack Construction

Well #	Sand Pack Above Top of Screen	Sealed With
1	-4.5'*	1' bentonite
2	8'	2' bentonite
3	3'	2' bentonite
4	2'	2' bentonite
4A	10'	not sealed
5	3'	2' bentonite
6A	2'	2' bentonite
6B	2.5'	2' bentonite
7	3'	2' bentonite
8	3'	3' "clay"
9	8'	1' bentonite
10	2'	2' bentonite
11	2.5'	2' "clay"

* The sand pack ended 4.5' below the top of the well screen. Then caved material was present until 1.5' above the top of the well screen.

7. Three of the wells have fill or caved material that effectively lengthens the screen interval (MW-1, MW-2, MWW - 6A).
8. Well Ex-1, drilled to a depth of 76 feet, is not addressed in any submitted report except for an incomplete drill log.

3.3.4 Sampling and Analysis Program

Federal regulations require a Sampling and Analysis Plan (SAP) which sets forth the procedures and techniques for sampling, shipping, and analyzing ground water samples [40 C.F.R. Part 265.92(a)]. In the original proposal by J. H. Kleinfelder & Associates [5], it is stated that a SAP would be prepared. To date, however, a formal SAP has not been submitted.

Appendix A of the assessment monitoring work plan by J. H. Kleinfelder & Associates [7] contains the only discussion of ground water sampling procedures. A 4 page section of Appendix A of the Work Plan [7] is being used as a sampling and analysis plan. It details the equipment to be used for sampling and purging of the wells and decontamination between wells. It indicates that a chain-of-custody procedure will be used and briefly discusses quality control. It addressed duplicate samples, split samples, and cross contamination. No other procedures such as recording of well depth, problems encountered, specific sampling techniques, preservation, and methods of analysis were addressed. Methods of analysis are reported in the quarterly monitoring reports submitted by the owner/operator. During the visual site inspection, well purging and sampling were done with a silicon bladder pump. A minimum of five well volumes of water was purged prior to sampling. As the wells were purged, temperature, pH, and conductivity measurements were taken. The facility representatives stated that meter calibration was done once in the morning. Nancy Ball of the DHS Hazardous Materials Laboratory in Berkeley noted that "calibration should be performed periodically throughout a sampling day, not just once in the morning." Sampling procedures are not stated in the "Sampling and Analysis Plan" and several sampling problems were noted by Nancy Ball during the site inspection:

1. The frequency of glove changes when sampling should occur more often.

2. Field notes should be written during all phases of the sample collection and should be kept in a bound note book.

3. Provisions should be made to sample for floaters and sinkers.

4. Decontamination procedures observed did not follow standard laboratory procedures. The correct procedures usually involve cleaning with a non-phosphate detergent and rinsing with Type II purified water.

5. Head space was not eliminated in the TOX and TOC containers.

In the environmental reports by J. H. Kleinfelder & Associates [6, 8, and 9], the consultant states that a "chain-of-custody form was maintained for all samples taken." This is the only

information available on chain-of-custody procedures. In other words, the responsibilities of the sampler, the shipper, and the laboratory representative authorized to receive the samples are never discussed. However, during the visual site inspection, it was observed that ground water samples were sealed correctly, sample analysis request forms were filled out, and standard chain-of-custody procedures were followed. One exception was in the labeling of sample bottles. Although the bottles were labeled with a Brown and Caldwell label, the samples were sent to Analytical Technologies, Inc. of San Diego.

The October 1987 Quarterly Sampling Report by J. H. Kleinfelder & Associates contains the most recent information concerning the analytical methods used by both Brown and Caldwell Laboratories and Analytical Technologies. However, it appears that the responsibility for selecting these methods is given to the laboratory, rather than the sampler (chain-of-custody records do not specify the specific EPA method to be used). When the sample results of samples taken during the site inspection were returned to the facility, contamination level differences were noted. Since Analytical Technologies was a new laboratory, both laboratory procedures were reviewed and it was discovered that Brown and Caldwell had been decanting metal samples before analysis instead of resuspending the solids of the metal samples; the correct procedures according to Nancy Ball.

The sampling procedures as outlined in J. H. Kleinfelder & Associates Work Plan [7] are not adequate in lieu of a formal sampling and analysis plan. According to Nancy Ball, among other procedures, a sampling and analysis plan should additionally include:

1. A table listing container type and volume, preservative and special handling requirements, analytical methods, shipping information, and holding times for each parameter to be analyzed for.

2. The sampling plan should include a section on site history and background and a detailed description of each monitoring well including dimensions, casing type, screened interval, etc.

3. The sampling plan should include a QA/QC section which satisfies the requirements listed in SW-846. The frequency of field duplicates, field spikes, performance evaluation samples, field blanks, equipment blanks, etc., should be described. The criteria to be used for the acceptance of data should also be listed.

3.4 Ground Water Quality

The initial results, March 1985, of ground water sampling indicated that ground water beneath the facility was contaminated. The analysis of split samples collected by RWQCB staff substantiated the high levels of chromium (500mg/L) and lower levels of cadmium (.78 mg/L) and zinc (.06 mg/L) in MW-4. On the basis of these data, the owner/operator concluded that the uppermost aquifer beneath the facility had been impacted.

Elevated levels of hexavalent chromium have been detected in MW-4 and MW-9. In MW-4, chromium was originally detected at 500 mg/L; since that time (March 1985), the levels have fluctuated between 61 mg/L and 550 mg/L. The most recent analysis (October 1987) detected 190 mg/L. Figure 8 shows how the chromium contamination in MW-4 has changed with time. Figure 9 shows the fluctuations in water levels beneath the facility. A comparison of these seems to indicate that the concentration fluctuates with the ground water levels.

MW-9 currently has 0.84 mg/L of chromium.

In March 1985, cadmium was detected at a concentration of 0.78 mg/L in MW-4. In October 1987, cadmium was detected at 0.33 mg/L. MW-4 is the only well with detectable levels of cadmium.

Even though MW-4 is immediately downgradient of Pond 1, the owner/operator claims that the source of chromium contamination is from an underground tank that was removed some time in the past. The underground tank was supposed to have been in an area slightly upgradient from Pond 1. However, the owner/operator has been unable to provide any evidence that this tank existed.

In March 1986, the owner/operator began submitting quarterly monitoring reports. These reports contain data which indicate that wells, both upgradient and downgradient of Pond 1 and the alleged underground tank area, are contaminated by volatile organic constituents. Ground water samples from MW-3, MW-4, MW-10, and MW-11 contain volatile organic compounds. According to the owner/operator only inorganic chemicals have been used at the facility and it is the opinion of the owner/operator that the volatile organic compounds detected are coming from an off-site source.

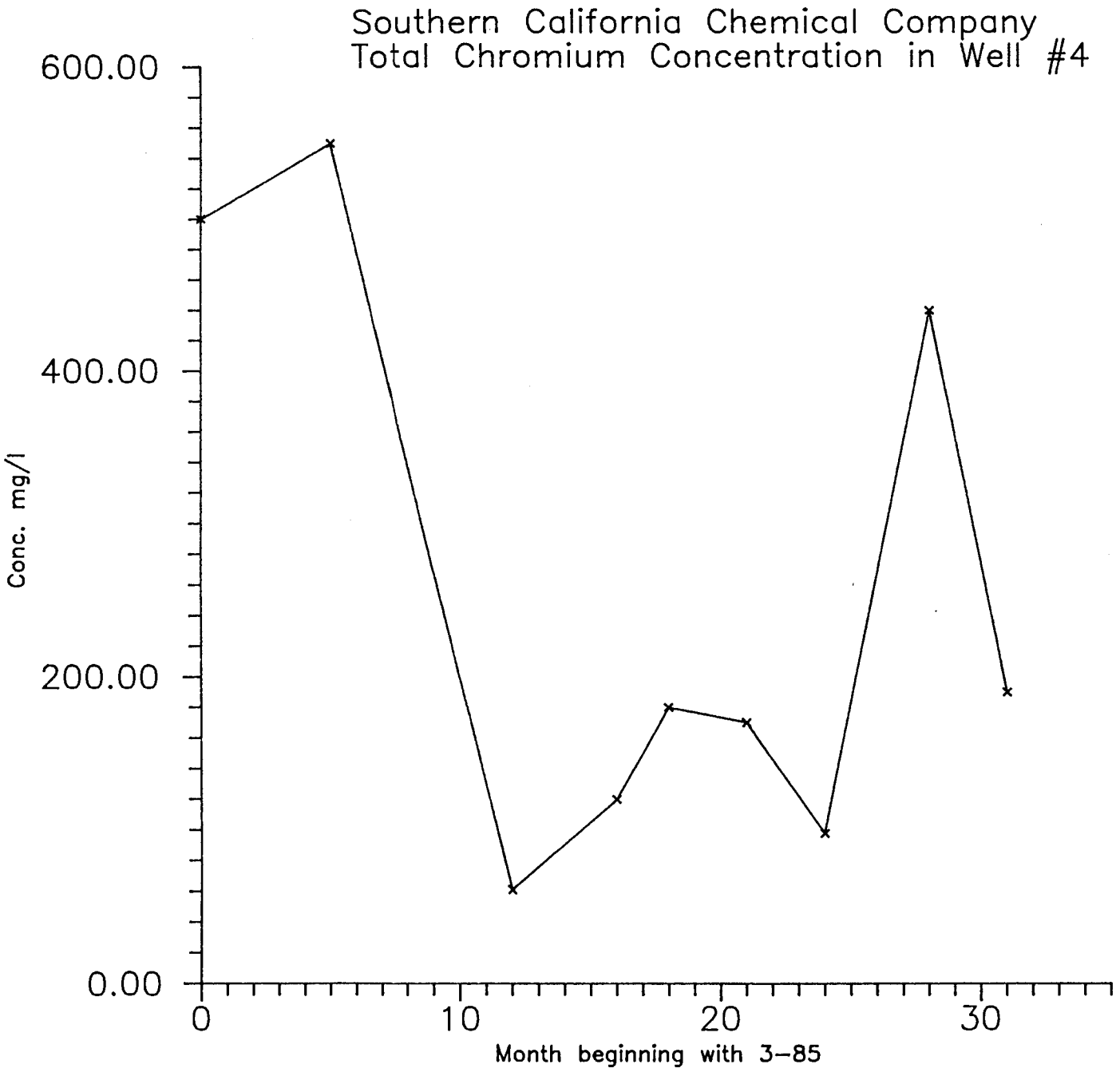

Southern California Chemical Company
Total Chromium Concentration in Well #4
600.00
400.00
200.00
0.00
Conc. mg/l
0
10
20
30
Month beginning with 3-85

Figure 8

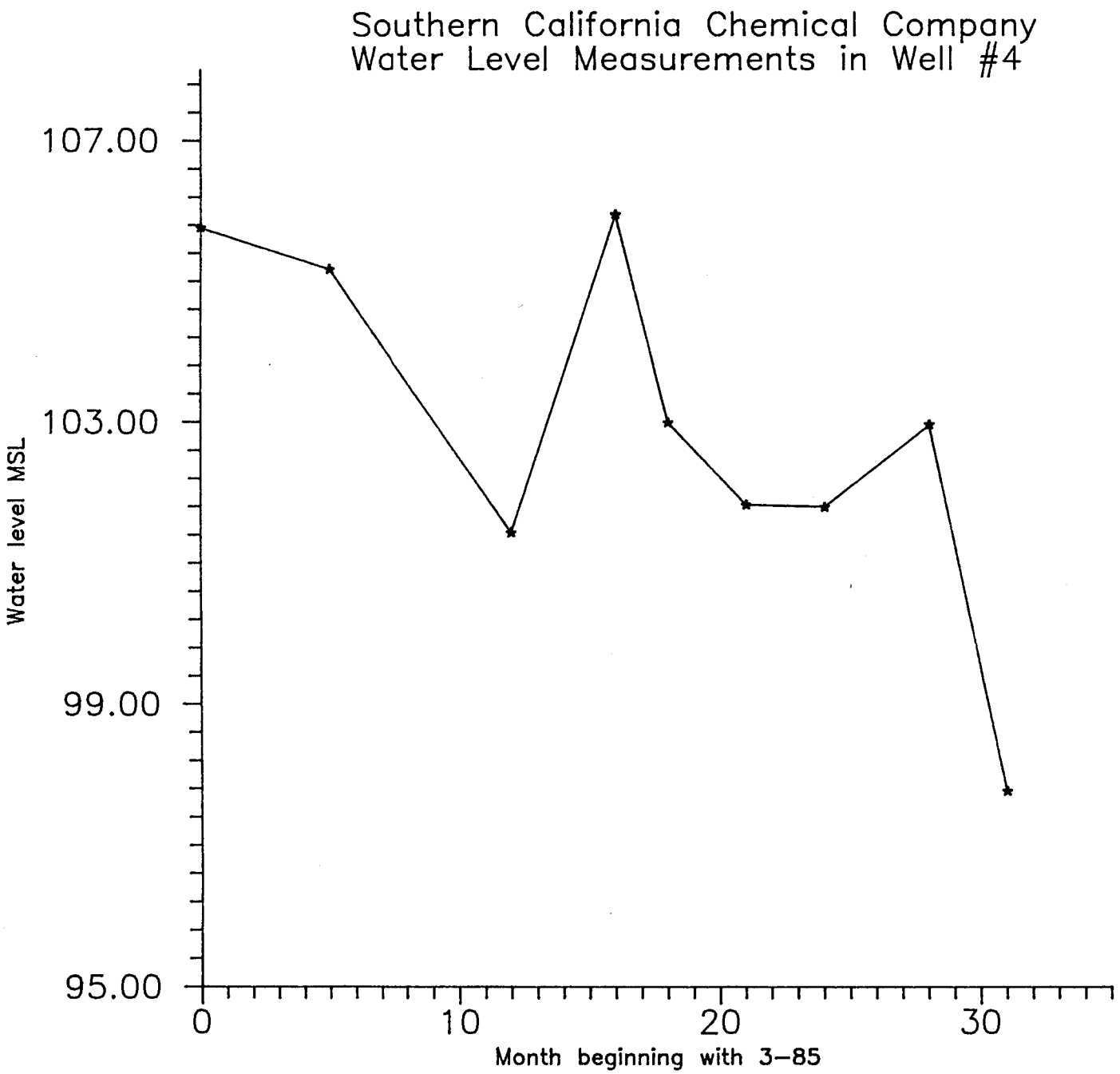

Southern California Chemical Company
Water Level Measurements in Well #4
107.00
103.00
99.00
95.00
Water level MSL
0
10
20
30
Month beginning with 3-85

Figure 6

4.0 REFERENCE DOCUMENTS

1. California Department of Health Services; Interim Status Document #CAD008488025, 16 December 1981, 23 p.

2. California Department of Water Resources; Bulletin 104 Appendix A, June 1961, 181 p.

3. Regional Water Quality Control Board; Comprehensive Ground Water Monitoring Evaluation at Southern California Chemical Company, 25 June 1986, 9 p.

4. J. H. Kleinfelder & Associates; Revised Proposal For Environmental Studies, Southern California Chemical Co., Inc., Santa Fe Springs, California, 13 June 1984, 5 p.

5. J. H. Kleinfelder & Associates; Revised Proposal For Environmental Studies, Southern California Chemical Co., Inc., Santa Fe Springs, California, 26 November 1984, 13 p.

6. J. H. Kleinfelder & Associates; Environmental Monitoring Study, Southern California Chemical Co., Santa Fe Springs, California, June 1985, 20 p.

7. J. H. Kleinfelder & Associates; Work Plan for Assessment Phase, Southern California Chemical Company, (no date) 16 p.

8. J. H. Kleinfelder & Associates; Hydrogeologic Assessment of Pond Number 1, Southern California Chemical Co., Inc., Santa Fe Springs, California, 24 October 1985, 18 p.

9. J. H. Kleinfelder & Associates; Environmental Assessment, Southern California Chemical Co., Inc., Santa Fe Springs, California, March 1986, 28 p.

10. A. T. Kearney, Inc., and Science Applications International Corporation; RCRA Facility Assessment, Southern California Chemical Company, Inc., Santa Fe Springs, California, September 1987, 97 p.

11. Southern California Chemical Company, Inc.; (no title), 30 July 1985, 8 p.

12. Targee, Inc.; Workplan, Closure/Post-Closure, Pond Number 1, Southern California Chemical Company, Santa Fe Springs, California, (no date) 14 p.

APPENDIX A

REVIEW OF HYDROGEOLOGIC REPORT AND WRITTEN

GROUND WATER MONITORING PROGRAM

Appendix A

REVIEW OF HYDROGEOLOGIC REPORT AND WRITTEN GROUND WATER MONITORING PROGRAM

Company Name Southern California Chemical Co. EPA ID No. CAD008488025

Company Address 8851 Dice Road Date 1-8-88 / 5-20-88

Santa Fe Springs, CA 90670 Reviewer's Name Athar Kahn /

Geologic Consultant J.H. Kleinfelder & Assoc. CME Task Force

Consultant's Address 17100 Pioneer Blvd Reviewer's Civil Service Classification Sanitary Eng. Associate

Artesia, CA 90701

Type of Facility	Lined	Liner Type	Number of Each Unlined	Double Lined	Liner Types
(x) Surface Impoundment	____	(see comment)	____	____	____
(b) Landfill	____	____	____	____	____
(c) Land Treatment Facility	____	____	____	____	____
(d) Disposal Waste Pile	____	____	____	____	____

	Yes	No	Unknown
For all double-lined facilities: N/A			
Is there a leak detection system?	___	___	___
Has leakage ever been detected?	___	___	___
If yes to above, describe	____		

_____

		Yes	No	Unknown
1.	Has the owner/operator (O/O) conducted a hydrogeologic assessment of this site?	X*		
2.	Has O/O identified the uppermost aquifer?		X*	
3.	Are there other aquifers that may be hydraulically interconnected?	X*		
4.	Are these other aquifers identified?	X*		
5.	Does O/O have enough information to provide a reasonable understanding of the site's subsurface and to support the placement of wells capable of determining the facility's impact on the uppermost aquifer?		X*	
6.	Did the O/O use appropriate techniques to collect and interpret the information used to support well placement?		X*	
7.	If yes to question 6, what techniques were used?	N/A		
8.	Is the site being monitored at this time?	X-quarterly		
9.	Is the site being monitored under detection, assessment, or corrective monitoring?	Assessment Monitoring		
10.	Does the facility have a ground water assessment program outline?	X-Work Plan (Jun 85)		
11.	Does the outline contain all of the elements necessary to determine the rate, nature, and extent of any leaks?		X*	
12.	Was the hydrologic assessment report written by a qualified geologist?	X		
13.	Was the report accompanied by adequate support data, including:			
	Drill Logs	X*		
	Geologic Maps		X*	

* See comment. Comment number corresponds to question number.

		Yes	No	Unknown
	Topographic Map(s)	___	X*	___
	Cross Sections	___	X*	___
	Referenced Literature	X	___	___
	Other (list Fence Diagram)	X	___	___
14.	Was the boring program adequate to meet your evaluation needs?	X	___	___
15.	Was the number of cross sections adequate?	~~X~~ 7 cross sections		___
16.	Were the cross sections adequately detailed and at a scale that shows geologic features beneath the facility that affect the integrity of each waste management area?	___	X*	___
17.	Were the details on the cross sections corroborated by adequate support data?	___	X*	___
18.	Have ground water flow directions been determined?	X*	___	___
19.	Was flow direction determined on basis of piezometric data?	___	X*	___
20.	Was there evidence of a vertical gradient?	___	___	X*
21.	Was there mixing of data from wells and piezometers?	___	X*	___
22.	Were O/O conclusions about flow direction demonstrated with support?	___	X*	___
23.	If piezometers were used, what was screen length?	N/A		
24.	How many piezometers were used?	N/A		
25.	What was depth of piezometers?	N/A		
26.	Is there a rationale presented for the location and depth of each piezometer?	N/A	___	___
27.	Did the O/O determine the hydraulic conductivity?	___	X*	___

		Yes	No	Unknown
28.	What was method used to determine hydraulic conductivity?		*	
29.	Was the method used to determine hydraulic conductivity fully demonstrated with support data, including drawdowns, well layout(s), curve match points or straight line segments used, quantities of water injected or withdrawn and rate?	___	X*	___
30.	Provide values determined for:			
	Transmissivity 32,057 to 44,694 gpd/ft*			
	Storage Coefficient .0061 to .018			
	Leakage not addressed			
	Hydraulic Conductivity not calculated			
31.	Were sufficient hydraulic conductivity determinations made to document lateral and vertical variation in hydraulic conductivity in the entire subsurface below the site?	___	X*	___
32.	Are there as builts of all monitor wells and piezometers?	X*	___	___
33.	Did the O/O construct a flow net of the ground water movement on his site?	___	X*	___
34.	Are there variations in flow direction due to:			
	Intermittent pumping of nearby wells?	___	___	X*
	Seasonal variations?	X	___	___
	Tidal or other variations?	___	X	___
35.	How many upgradient wells have been constructed?	4-MW1,MW2,MW9,MW11*		
36.	Is this an adequate number based on data in the hydrogeologic report?	X*	___	___
37.	How many downgradient wells have been constructed?	4-MW4,MW4A,MW5,MW7*		

		Yes	No	Unknown
38.	Is there a rationale presented for the location of each monitoring well?	___	X*	___
39.	Is this an adequate number of downgradient wells on the basis of the hydrogeologic report?	___	X*	___
40.	Are there wells at the compliance point?	___	X*	___
41.	Are the downgradient wells located properly to intercept leakage?	___	X*	___
42.	Are the wells screened in the uppermost aquifer?	X*	___	___
43.	Are the wells screened at intervals where contaminants would be expected?	___	___	X*
44.	What is the screen length of wells?	15 to 35 feet		
45.	What was the method used to drill the wells?	hollow stem auger, mud rotary*		
46.	What was the method used to develop the wells?	airlift with a foot valve		
47.	Are the wells sealed?	X	___	___
48.	What is the sealant material?	cement & bentonite		
49.	Is there a seal between the filter pack and the cement?	X*	___	___
50.	If the seal between the filter pack and the cement is bentonite, what is the size of the particles? (½" pellets, ¼" pellets, coarse grit).	unknown, not addressed		
51.	Is the bentonite described in 50 above the water table?	~~X~~-except ~~4A~~		___
52.	What is the casing material?	~~NSF rated PW PVC~~		

		Yes	No	Unknown
53.	What is the screen material?	NSF rated PW PVC with .02" machine slots		
54.	Is there evidence of the methods used to select filter pack and screen slot size?		X*	
55.	Is the filter pack appropriate for the aquifer in which it is placed?			X*
56.	What is the size of the annular space?	Work Plan indicates 3"*		
57.	Is the screen slot size appropriate for the filter pack used?	X		
58.	Is there a written sampling and analysis plan?	X*		
59.	Does the sampling and analysis plan provide for: Work Plan (Jun 85)			
	Written procedures for purging wells?	X*		
	Providing clean equipment for sampling each well?	X		
	Are the sampling materials specified appropriate to the waste types being monitored?	X*		
	What sampling equipment and materials are specified?	air activated pump (bladder pump), teflon sampler lines, wire line level indicator		
	Avoidance of contamination of equipment transported to each location?	X		
	Measuring water levels?	X		
	Recording water levels?	X		
	Recording depth of well?		X*	
	Recording any problems encountered at each well?		X*	
	Measuring pH and specific conductivity in the field?	X		

		Yes	No	Unknown
	Collecting samples of ground water without degassing of volatile organics?	___	X*	___
	Use of appropriate equipment?	X	___	___
	Use of blanks, spikes, etc.?	X	___	___
	Details of sample preservation?	___	X*	___
	Methods of analyses to be used?	___	X*	___
60.	Have comparisons of ground water contamination indicator parameters for upgradient well(s) shown a significant increase (or pH decrease) over initial background?	___	X*	___
61.	Have comparisons of indicator parameters for downgradient wells shown a significant increase (or pH decrease) over initial background?	___	X*	___
62.	If yes to 61, were additional ground water samples taken from those downgradient wells where the significant difference was determined?	~~N/A~~	___	___
63.	If yes to 61, what was source of significant increase over initial background?	~~N/A~~		
64.	If yes to 61, has the O/O submitted an assessment program?	~~N/A~~	___	___
	Has this program been approved?	~~N/A~~	___	___
65.	Has O/O compared monitoring data collected downgradient to that from upgradient for a period of at least one year?	___	X*	___
66.	Was it determined that hazardous waste or hazardous waste constituents from the facility have entered the ground water?	X*	___	___

		Yes	No	Unknown
67.	If yes to above, has there been a determination of the rate of migration of hazardous waste or hazardous waste constituents from the facility?	___	X*	___
68.	If yes to 67, list the constituents originating from the waste management area.	N/A		
69.	List the wells which have shown statistically significant increases.	N/A*		
70.	Were the significant increases in contaminant concentration determined through the use of the Student's t-test?	N/A	___	___
	If no, which test was used?	___	___	___
	Was this an appropriate test?	___	___	___
71.	List the chemical and physical properties of the contaminants which have been detected in the ground water (density, solubility, etc.).	*		
72.	Are there differences between up and downgradient wells which qualitatively suggest there may be a leak?	X	___	___
73.	Has the O/O opted to know or assume there is a leak in lieu of performing a statistical test?	___	X*	___
74.	List wells that show qualitative increases (or pH decrease) and parameters that are shown to increase (or decrease if pH).	MW4,MW9	___	___

		Yes	No	Unknown
75.	Has the extent of the migration of hazardous waste or hazardous waste constituents been determined?	___	X*	___
76.	If yes to above, list method used (additional monitor wells, geophysical methods, computer modeling, etc.).	N/A		
77.	Are the locations of additional wells shown on the map?	X*	___	___
78.	Are the locations of additional wells reasonable on the basis of the data provided?	___	X*	___
79.	Are the depths of additional wells reasonable on the basis of the data provided?	___	___	X*
80.	Is the ground water monitoring program described in the hydrogeologic assessment report adequate for this site?	___	X*	___
81.	List dates of all quarterly, semiannual, and annual reports received.	*		
82.	List dates of all incidents and incident reports received.	not known		
83.	List any reports missing.	4th quarter 1987		
84.	Have all reporting requirements been met?	___	X*	___

Comments for Appendix A

Pond 1 was a 36,000-gallon treatment pond constructed of 6" reinforced concrete. In 1985 pond use was discontinued. Subsequently, the pond was coated with asphalt and converted into a secondary spill containment for above-ground tanks.

1. During the first sampling of RCRA detection monitoring Southern California Chemical Co. (SCCC) discovered chromium contamination and launched SCCC into assessment. J. H. Kleinfelder & Associates, a geologic consultant, has installed 13 monitoring wells and submitted an Assessment Report; however, this report does not adequately determine the depth and extent of contamination.

2. The owner/operator's (O/O) consultant reports the Gage Aquifer is the uppermost aquifer but is dry (however two water level readings were reported: 4/85 and 8/85) and that the Gage Aquifer is underlain by a silty clay layer (aquiclude) which is underlain by the Jefferson Aquifer. The owner/operator's consultant states that the Jefferson Aquifer is the uppermost water bearing aquifer beneath the site and all aquifer parameters, etc. refer to the Jefferson Aquifer. This stratigraphic sequence is inconsistent with DWR Bulletin 104 [2]. See sections 3.1 and 3.2 of the CME report.

3. The O/O's consultant states that the Gage Aquifer is dry and that the next lower aquifer, the Jefferson Aquifer, is the "uppermost water bearing formation". According to DWR Bulletin 104 there are three aquifers of significance that may be hydraulically interconnected below the site: Gage Aquifer, Hollydale Aquifer, and Jefferson Aquifer in increasing depth order.

   The Gage and Jefferson Aquifers are addressed in the Assessment Report [9] as being separated by a 15- to 25-foot thick aquiclude. No other hydraulic interconnections were mentioned and no other aquifers were specifically mentioned.

4. The O/O's consultant states that the Gage Aquifer is dry and that the next lower aquifer, the Jefferson Aquifer, is the "uppermost water bearing formation". According to DWR Bulletin 104 there are three aquifers of significance that may be hydraulically interconnected below the site: Gage Aquifer, Hollydale Aquifer, and Jefferson Aquifer in increasing depth order.

   The Gage and Jefferson Aquifers are addressed in the Assessment Report [9] as being separated by a 15- to 25-foot thick aquiclude. No other hydraulic interconnections were mentioned and no other aquifers were specifically mentioned.

5. Since the O/O has misidentified the stratigraphy beneath the site, the O/O does not have enough information to provide a reasonable understanding of the site's subsurface. Further, the O/O has misidentified the aquifer in which the monitoring wells were drilled so there is not enough information to support the placement of these wells.

6. The Assessment Report [9] does not support or discuss well placement; well placement was not based on an adequate site characterization. An adequate site characterization should also include an understanding of the subsurface correctly identifying stratigraphy, the uppermost aquifer, hydraulically interconnected aquifers, vertical gradients, and hydraulic conductivity.

11. Well placement based on inadequate site characterization is not adequate to determine the rate, nature, and extent of any leaks.

13. Drill Logs: The drill logs drafted by the O/O's consultant do not contain all the information on the original drill logs. The original drill logs show caved materials, bentonite seals, and filled materials but there is no discussion of grain size, sorting, or type of materials these were. Also some wells were drilled to a depth and then filled in 10 feet or more. These procedures should be explained.

Geologic Maps: A geologic map was not submitted.

Topographic Maps: A topographic map was not submitted.

Cross Sections: Geologic cross sections are hand drawn imprecisely and do not show detail. Cross section lines are not located on a map. The regional cross section submitted by the O/O's consultant is incorrectly taken from DWR Bulletin 104 [2] and applied to this site. Further, the consultant has mislocated the site on this cross section.

16. Geologic cross sections are hand drawn imprecisely and do not show detail. Cross section lines are not located on a map. The regional cross section submitted by the O/O's consultant is incorrectly taken from DWR Bulletin 104 [2] and applied to this site. Further, the consultant has mislocated the site on this cross section.

17. Cross sections were not detailed. Some stratigraphic horizons within a single boring were drawn at different thicknesses and depths on cross section lines. Cross sections were not corroborated by adequate support data.

18. Flow directions were not determined using piezometers and vertical gradients were not addressed.

19. Flow directions were not determined using piezometers.

20. Flow directions were not determined using piezometers and vertical gradients were not addressed.

21. All data was from wells.

22. Flow directions were determined using wells with different length screens.

27. O/O did not determine hydraulic conductivity.

28. O/O did not determine hydraulic conductivity, however two pump tests were performed to determine storage coefficients and transmissivity values.

29. O/O did not determine hydraulic conductivity.

30. Transmissivity was calculated using the Jacob-Cooper approximation. The Jacob-Cooper approximation requires that the aquifer be confined. The data from the pump tests suggest that this aquifer is not confined.

31. O/O did not determine hydraulic conductivity.

32. The as-builts drafted by the O/O's consultant do not contain all the information on the original drill logs and in one well did not show the proper screen interval. Some wells show caved material and fill material, but there is no discussion of what these materials were, their grain size, or sorting. Some wells were drilled to a depth and then filled in 10 feet or more. These procedures should be explained.

33. O/O did not construct a flow net.

34. There are 4 pumping wells within a 1 mile radius. Their effect on ground water flow was not addressed.

35. There are 4 upgradient wells - MW-1, MW-2, MW-9, MW-11. Only MW-1 is an adequate upgradient well. MW-2 is contaminated with organics and MW-9 is contaminated with chromium from a source other than Pond 1. MW-11 is not upgradient of the pond area. In addition, there are 5 wells neither upgradient nor downgradient that are in the vicinity of Pond 1 - MW-3, MW-6A, MW-6B, MW-8, MW-10.

36. There are 4 upgradient wells - MW-1, MW-2, MW-9, MW-11. Only MW-1 is an adequate upgradient well. MW-2 is contaminated with organics and MW-9 is contaminated with chromium from a source other than Pond 1. MW-11 is not upgradient of the pond area. In addition, there are 5 wells neither upgradient nor downgradient that are in the vicinity of Pond 1. MW-1 is sufficient for upgradient, background water quality.

37. There are 4 downgradient wells - MW4, MW4A, MW-5, MW-7. MW-7 is not an adequate downgradient well because it is not down gradient of Pond 1. MW-4, MW-4A, and MW-5 are spaced too far apart to adequately characterize any contamination from Pond 1.

38. The rationale presented for placement of wells is not based on adequate site characterization. See section 3.3.1 of the CME report.

39. There is not an adequate number of down gradient wells since MW-4, MW-4A, and MW-5 are spaced too far apart to adequately characterize contamination from Pond 1.

40. Since SCCC is currently being monitored under Assessment, compliance point is less relevant. However, well placement does not adequately characterize contamination from Pond 1 and is based on inadequate site characterization.

41. There are 4 downgradient wells - MW4, MW4A, MW-5, MW-7. MW-7 is not an adequate downgradient well because it is not down gradient of Pond 1. MW-4, MW-4A, and MW-5 are spaced too far apart to adequately characterize any contamination from Pond 1.

42. The uppermost aquifer has not been properly identified. The O/O's consultant claims the uppermost stratigraphic aquifer, the Gage Aquifer, is dry. However, two water level readings were reported 4-85 and 8-85. Further, the Hollydale Aquifer appears to be the uppermost aquifer rather than the Jefferson Aquifer.

43. There is not adequate site characterization to determine where contaminants would be expected.

45. In the O/O's approved proposal [6] all wells were to be drilled using a hollow stem auger. Alleged difficulties during drilling brought about a modification to this procedure in which drilling deeper than 45 feet at all wells was supposedly done with mud rotary equipment. However, available information suggests that a different sequence of events actually took place. See section 3.3.3 of the CME report.

49. A bentonite or "clay" seal 1- to 3- feet thick was used.

54. Methods used to select filter pack and screen slot size were not addressed.

55. No grain size analysis or other study of the screened aquifer was submitted that would indicate the appropriate filter pack.

56. In the Work Plan [7] 2" monitoring wells were to be drilled with an 8" hollow stem auger and 4" monitoring wells were to be drilled with a 10" hollow stem auger leaving a 3" annular space in all wells. However, available information suggests that a different sequence of events actually took place. See section 3.3.3 of the CME report.

58. There is no adequate sampling and analysis plan. A 4 page section of Appendix A of the Work Plan [7] is being used as a sampling and analysis plan. It details the equipment to be used for sampling and purging of wells and decontamination between wells. It indicates that a chain-of-custody procedure will be used and briefly discusses quality control. It addressed duplicate samples, split samples, and cross contamination. No other procedures such as recording of well depth, problems, specific sampling techniques, preservation, and methods of analysis were addressed.

59. There is no adequate sampling and analysis plan. A 4 page section of Appendix A of the Work Plan [7] is being used as a sampling and analysis plan. It details the equipment to be used for sampling and purging of wells and decontamination between wells. It indicates that a chain-of-custody procedure will be used and briefly discusses quality control. It addressed duplicate samples, split samples, and cross contamination. No other procedures such as recording of well depth, problems, specific sampling techniques, preservation, and methods of analysis were addressed.

- Plan does not provide for recording depth of well.
- Plan does not provide for problems encountered.
- Plan does not address sample collection procedures.
- Plan does not address details of sample preservation.
- Plan does not address methods of analysis.

60. Background has not been established. No comparisons have been made.

61. Background has not been established. No comparisons have been made.

65. Quarterly sampling reports have been submitted to the Regional Board since 1986 but no comparisons or statistical analyses have been done.

66. During the first sampling of RCRA detection monitoring SCCC discovered chromium contamination in two wells and launched SCCC into Assessment. The O/O has stated that the leak came from an old underground tank but they can not provide any records that prove the tank existed. One of the wells contaminated with the highest levels of chromium is immediately downgradient of Pond 1 which received chromium wastes.

67. Migration rates have not been addressed.

69. Quarterly sampling reports have been submitted to the Regional Board since 1986 but no comparisons or statistical analyses have been done.

71. Chromium, copper, and cadmium are the principal contaminants detected in the ground water. Some of the important properties related to water quality are as follows:

Chromium - Chromium has oxidation states ranging from Cr+2 to Cr+6; the trivalent form is found most commonly in nature. Chromium is slightly soluble in water.

Copper - Copper has a density of 0.322 lbs/in3 and a specific gravity of 8.91. Some copper salts are highly soluble in water.

Cadmium - Cadmium is less soluble in water but readily soluble in mineral acids.

73. During the first sampling of RCRA detection monitoring SCCC discovered chromium contamination in two wells and launched SCCC into Assessment. The O/O has stated that the leak came from an old underground tank but they can not provide any records that prove the tank existed. One of the wells contaminated with the highest levels of chromium is immediately downgradient of Pond 1 which received chromium wastes.

75. The extent of the migration of hazardous waste or hazardous waste constituents has not been determined.

77. Additional wells were drilled after the first sampling where contamination was found. The additional wells are included in the Assessment Report [9].

78. Well placement based on inadequate site characterization is not adequate to determine the rate, nature, and extent of any leaks.

79. Well placement based on inadequate site characterization is not adequate to determine the rate, nature, and extent of any leaks.

80. Well placement based on inadequate site characterization is not adequate to determine the rate, nature, and extent of any leaks. Also the sampling and analysis plan is inadequate.

81. - 1st Quarterly Sampling Report 1986
- 2nd Quarterly Sampling Report 1986
- 3rd Quarterly Sampling Report 1986
- 4th Quarterly Sampling Report 1986
- 1st Quarterly Sampling Report 1987
- 2nd Quarterly Sampling Report 1987
- 3rd Quarterly Sampling Report 1987

84. The 4th Quarter Sampling Report 1987 was not submitted as of this date.

Note: The following reports were used to complete Appendix A:

"Work Plan for Assessment Phase"	submitted June 1985
"Assessment Report"	submitted Mar 1986
"Appendices"	submitted Mar 1986

APPENDIX B

FIELD REVIEW OF HAZARDOUS WASTE DISPOSAL SITE

TO DETERMINE COMPLIANCE WITH GROUND WATER MONITORING REQUIREMENTS

Appendix B

FIELD REVIEW OF HAZARDOUS WASTE DISPOSAL SITE TO DETERMINE COMPLIANCE WITH GROUND WATER MONITORING REQUIREMENTS

Company Name Southern California Chemical Co. EPA ID No. CAD 008488025

Company Address 8851 Dice Road Date 2-3-88 / 5-19-88

Santa Fe Springs, CA 90670 Reviewer's Name Athar Kahn /

Geologic Consultant J.H. Kleinfelder & Assoc. CMF Task Force

Consultant's Address 17100 Pioneer Blvd Reviewer's Civil Service Classification Sanitary Eng. Assoc.

Artesia, CA 90701

Type of Facility	Lined	Liner Type	Number of Each Unlined	Double Lined	Liner Types
(a) Surface Impoundment	___	(see comment)	___	___	___
(b) Landfill	___	___	___	___	___
(c) Land Treatment Facility	___	___	___	___	___
(d) Disposal Waste Pile	___	___	___	___	___

	Yes	No	Unknown
For all double-lined facilities:			
Is there a leak detection system? N/A	___	___	___
Does the leak detection system currently have liquid in it?	___	___	___
Is there any indication that leakage has occurred?	___	___	___
If yes to above, describe	___		

___

		Yes	No	Unknown
1.	Was the ground water monitoring program and geologic assessment report reviewed prior to site visit?	X	___	___
2.	Has the ground water monitoring plan been implemented?	X*	___	___
3.	Do the plans and descriptions provided in the geologic report accurately reflect:			
	Site geology, including lithology, structure, primary and secondary permeability?	___	X*	___
	Site topography?	___	X*	___
	Current status of facilities?	___	X*	___
4.	Is a regional map of the area, with the facility delineated, included in the report?	X	___	___
5.	If yes, what is the scale?	1" = 2000'		
6.	Is there a topographic map of the site at a scale of 1 inch = 200 feet that shows the topography and all units present at the facility?	___	X*	___
	If not 1 inch = 200 feet, show scale.	N/A		
	Show contour interval.	N/A		
7.	Are there any streams, rivers, lakes, or wetlands near the facility?	X	___	___
8.	If yes to above, list and give approximate distance and indicate apparent up- or downgradient direction.			

1. San Gabriel River - 1 mile downgradient to the west

2. Sorensen Avenue storm drain - 1/4 mile upgradient to the northeast

* See comment. Comment number corresponds to question number.

		Yes	No	Unknown
9.	Is there any evidence in these adjacent water bodies of contaminants coming from the facility?	___	X*	___
	What is the evidence?			
10.	Are there any discharging or recharg- wells near the facility?	X	___	___
11.	If yes to above, list and give approxi- mate distance and indicate apparent up- or downgradient direction?	*		
12.	Is a site water table contour map included in the geologic report?	X	___	___
13.	Does the contour map appear logical on the basis of topography and observed data?	X	___	___
14.	Are static water levels shown?	X	___	___
15.	Is at least one monitoring well located in the area that appears to be hydraulically upgradient?	X	___	___
16.	List all upgradient wells by number			
	MW-1, MW-2, MW-9, MW-11*			
17.	Are at least three monitoring wells located in an area that appears to be hydraulically downgradient?	X	___	___
18.	List all downgradient wells by number			
	MW-4, MW-4A, MW-5, MW-7*			
19.	Are there any seeps or wet areas downgradient of the facility?	___	X	___
20.	Are there downgradient areas that appear to be in need of additional monitoring wells?	X	___	___
	If yes, describe the locations.	*		

		Yes	No	Unknown
21.	List the number of wells at the site.	13 wells - 4 upgradient, 4 downgradie 5 neither up nor down		
22.	Are there concrete surface seals?	X	___	___
23.	Are the wells capped?	X*	___	___
24.	Do the caps lock?	___	X*	___
25.	Are there protective standpipes in place around above-ground wells?	no above ground wells		
26.	Is the plot plan used for the inspection the same as the one in the monitoring program plan documentation?	X	___	___
27.	Are all components of the facility identified during the field review addressed in the monitoring program documentation?	___	X*	___
28.	Are monitor well locations and numbers observed at the site in agreement with locations and numbers shown in the hydrogeologic report which documents the monitoring program?	X	___	___
29.	Were locations and elevations of the monitor wells surveyed into some known datum?	X	___	___
30.	When you sounded the wells to determine total depth, were there discrepancies between your measurements and the listed depths of greater than two feet?	X	___	___
31.	List those wells where your measured depth differed from the listed depth by more that two feet.	*		
32.	If any wells were not sounded to determine total depth, list the wells by number and explain the reason each was not sounded.	*		

		Yes	No	Unknown
33.	Was ground water encountered in all monitoring wells?	___	X*	___
34.	List any wells which were dry.	MW-6A*		
35.	Are samples from any well turbid (where turbidity means fine material from the aquifer, not chemical or biologic reactions in the well)?	X	___	___
36.	List wells that produce turbid samples?	MW-3*		
37.	What material (Teflon, stainless steel 316 or 304, PVC, etc.) was used in the construction of the well casing? PVC Well screen? .02" machine slotted PVC			
38.	Is there a copy of the sampling plan at the facility?	X*	___	___
39.	Is the plan being followed in regard to:			
	Sampling schedule?	X	___*	___
	Sampling methods?	___	X**	___
	Sample preservation	___	X	___
	Sample handling?	X	___*	___
	Sample analysis?	___	X*	___
	Record keeping?	___	X	___
40.	List any deviation from the sampling and analysis plan.	*		
41.	Are organic constituents to be sampled?	X	___	___
42.	Are samples collected with appropriate equipment and methods to minimize absorption and volatilization?	___	X*	___
43.	Are appropriate sample preservation and preparation procedures being followed (filtration and preservation, as appropriate)?	___	___	X*

		Yes	No	Unknown
44.	Are samples refrigerated?	X	—	—
45.	Are Environmental Protection Agency (EPA) recommended sample holding period requirements being adhered to?	X - According to O/O		
46.	Are suitable container types being used?	X	—	—
47.	Is a chain of custody control procedure clearly defined?	—	X*	—
48.	Is sample analysis performed by a qualified laboratory?	X	—	—
49.	Name of laboratory performing analyses?	Brown & Caldwell Analytical Technologies, Inc.		
50.	Are analytical methods described in the records?	—	X*	—
51.	Are the required ground water quality parameters being tested for? (Chloride, phenol, etc.)	X	—	—
52.	Are the required ground water contamination indicator parameters being tested for? (pH, Conductance, total organic carbon, total organic halogen)	X	—	—
53.	Are any analytical parameters determined in the field?	X - pH, sp. cond., temp.		
54.	Are field activity logs included?	X	—	—
55.	Are field activity logs filled in as samples are being collected?	X	—	—
56.	Are the names and position of the field personnel included in the field logs?	—	X	—
57.	Is an analysis program set up to determine the presence of contamination using EPA guidelines?	N/A*	—	—
58.	Have all record keeping requirements been met?	—	X*	—

	Yes	No	Unknown
59. List all records kept at the facility.		*	
60. Are there relevant records at the facility which should be provided to the Department?	X		
If yes, list them.	information reguarding the extraction well Ex-1 including location, ~~justification for location~~, and details of the well design.		
61. Brief summary of site conditions and comments on the ground water monitoring program at this site.		*	
62. Is a more detailed technical evaluation required to determine the adequacy of the ground water monitoring program at this site?		~~X~~	
Why?	Adequacy of the ground water monitoring program has been determined.		

Comments for Appendix B

Pond 1 was a 36,000-gallon treatment pond constructed of 6-inch steel reinforced concrete. In 1985, pond use was discontinued. Subsequently, the pond was coated with asphalt and converted into a secondary spill containment for above-ground tanks.

2. The facility's consultant, J. H. Kleinfelder & Associates, has submitted a "Work Plan for Assessment Phase" [7]. Some procedures and materials described in the plan were not observed during the inspection. For example, the Work Plan specified that samples would be taken using a stainless steel and viton bladder pump. The Task Force observed a silicon bladder pump being used for sampling. Also there is no formal Sampling and Analysis Plan; the facility is following "ground water monitoring protocols and procedures" as described in Appendix A of the Work Plan.

3. A geologic map was not included in the Assessment Report [9]. Lithology descriptions appeared to be accurate however, the geologic consultant has misidentified the aquifer sequence (ie. Hollydale Aquifer as the Jefferson Aquifer). The regional cross section included in the Assessment Report was taken incorrectly from Bulletin 104 [2] and does not apply to this site. Further, the consultant has mislocated the site on this cross section. Primary and secondary permeability is not addressed in the Assessment Report.

   - The Assessment Report did not include a topographic map.

   - The O/O had made several changes to the site since the descriptions in the Assessment Report. For example, a copper-sulfate operation had been removed, tanks had been relocated, and a past waste disposal area had been paved.

6. The Assessment Report [9] did not include a topographic map.

9. Adjacent water bodies were not tested.

11. According to the Assessment Report [9] there are 4 pumping wells within a 1 mile radius. Their location and their effect on ground water flow were not addressed and the wells were not observed during the site inspection.

16. There are 4 upgradient wells - MW-1, MW-2, MW-9, MW-11. Only MW-1 is an adequate upgradient well. MW-2 is contaminated with organics and MW-9 is contaminated with chromium from a source other than Pond 1. MW-11 is not upgradient of the pond area. In addition, there are 5 wells neither upgradient nor downgradient that are in the vicinity of Pond 1 - MW-3, MW-6A, MW-6B, MW-8, MW-10.

18. There are 4 downgradient wells - MW4, MW4A, MW-5, MW-7. MW-7 is not an adequate downgradient well because it is not down gradient of Pond 1. MW-4, MW-4A, and MW-5 are spaced too far apart to adequately characterize any contamination from Pond 1.

20. Downgradient well placement is not adequate to characterize contamination from Pond 1 because the three relevant downgradient wells are spaced too far apart and because well placement is based on inadequate site characterization. Following an adequate site characterization, additional wells spaced between those existing and screened at proper intervals will be necessary to characterize the contamination from Pond 1.

23. During the inspection, the Task Force observed water standing in the vault around three wells. The water level in MW-10 vault was 2 to 3 inches with blue-green and white crystals indicating a potential source of contamination to the well.

24. According to the facility consultant, the caps could only be opened with a special hollow Allen-wrench, but the caps did not have locks. During the field inspection one cap was off, two caps were broken, and two more caps were not screwed back on after sampling.

27. The O/O had made several changes to the site since the descriptions in the Assessment Report. For example, a copper-sulfate operation had been removed, tanks had been relocated, and a past waste disposal area had been paved.

31.

	measured well depth	reported well depth
MW2	70.80'	75.0'
MW3	70.88'	75.0'
MW4	67.35'	75.0'
MW8	69.99'	75.0'

32. MW-6A was not sounded because no samples have been taken from the well and the consultant claims the well is dry.

33. According to J. H. Kleinfelder & Associates, MW-6A is dry; however, they also reported two water level readings - 4/85 and 8/85.

34. According to J. H. Kleinfelder & Associates, MW-6A is dry; however, they also reported two water level readings - 4/85 and 8/85.

36. Task Force members observed 3 wells being sampled - MW-3, MW-4, MW-11.

38. The facility's consultant, J. H. Kleinfelder & Associates, has submitted a "Work Plan for Assessment Phase" [7]. Some

procedures and materials described in the plan were not observed during the inspection. For example, the Work Plan specified that samples would be taken using a stainless steel and viton bladder pump. The Task Force observed a silicon bladder pump being used for sampling. Also there is no formal Sampling and Analysis Plan; the facility is following "ground water monitoring protocols and procedures" as described in Appendix A of the Work Plan.

39. - The Work Plan [7] does not address sampling methods.

- The Work Plan [7] does not address sample preservation.

- The Work Plan [7] does not address specific sample analysis.

- The Work Plan [7] does not address record keeping.

40. The Work Plan specifies only that sampling methods will be in accordance with 14th Edition of Standard Methods. The Task Force observed that certain sample collection methods, preservation methods, and sample preparations were not appropriate. For example, there was headspace in the sample bottles for TOX and TOC and the consultant did not follow a certain order when collecting samples. Sample bottles were marked with a test lab label, Brown & Caldwell Laboratories, Pasadena, CA, then they were sent to Analytical Technologies, Inc., San Diego, CA. Sample holding times, sampling procedures, and chain-of-custody control procedures are not clearly defined in the Work Plan [7].

42. The Work Plan specifies only that sampling methods will be in accordance with 14th Edition of Standard Methods. The Task Force observed that certain sample collection methods, preservation methods, and sample preparations were not appropriate. For example, there was headspace in the sample bottles for TOX and TOC and the consultant did not follow a certain order when collecting samples. Sample bottles were marked with a test lab label, Brown & Caldwell Laboratories, Pasadena, CA, then they were sent to Analytical Technologies, Inc., San Diego, CA. Sample holding times, sampling procedures, and chain-of-custody control procedures are not clearly defined in the Work Plan [7].

43. The samples were pre-preserved by the laboratory and were not observed by the Task Force.

47. The Work Plan [7] states only that a chain-of-custody procedure will be used; there are no details.

50. The Work Plan [7] does not address analytical methods, however, laboratory methods used were reported in the Quarterly Sampling Reports.

57. The presence of contamination has already been established.

58. The 4th Quarter Sampling Report 1987 was not submitted as of this date.

59. Records kept at the facility are too voluminous to list. All hydrogeological reports, Quarterly Sampling Reports, site operational papers, manifests, etc. are kept at the facility, but when asked for a copy of the Sampling and Analysis Plan the O/O could not provide one.

61. SCCC is located in an industrial area where ground water contamination is common. SCCC has been operating since 1958 and past procedures and disposals have not been documented. Old operations have been built over with new operations which may or may not process the same chemicals. During the first sampling of RCRA detection monitoring SCCC discovered chromium contamination in two wells and launched SCCC into Assessment. The O/O has stated that the leak came from an old underground tank but they can not provide any records that prove the tank existed. One of the wells contaminated with the highest levels of chromium is immediately downgradient of Pond 1 which received chromium wastes. Well placement based on inadequate site characterization is not adequate to determine the rate, nature, and extent of any leaks. Also the sampling and analysis plan is inadequate.

APPENDIX C

1985 PUMP TEST DATA

PROJECT NUMBER Q-1014-2 SOUNDER NUMBER 1

TEST TYPE Step drawdown WELL NUMBER 9 pumping well

REFERENCE POINT Top of 5/8" plate above top of fill ring

DATE	TIME		DEPTH TO WATER (FEET)	DRAW DOWN (RECOVERY) (FEET)	PUMPING RATE (METER)		OBSERVATIONS
	ELAPSED (MIN.)	24 HOUR				GPM	
8-19-85	0	0	44.26	0.00	171274		
	1	1	50.79	6.53		24.2	
	2	2	49.78	4.42		24.2	
	3	3				24.2	
	4	4	51.62	7.36		24.2	
	5	5	52.10	7.84		24.2	
	6	6	52.09	7.83		24.2	
	7	7	52.28	8.16		24.2	
	8	8	52.41	8.15		24.2	
	9	9	52.28	8.02		24.2	
	10	10	52.38	8.12		24.2	
	12	12	52.45	8.19	171565	24.2	
	14	14	52.40	8.14		22.6	
	16	16	52.60	8.34		22.6	
	18	18	52.54	8.28		22.6	
	20	20	52.62	8.36	171746	22.6	
	25	25	52.71	8.45		24.2	
	30	30	52.95	8.69	171988		
	35	35	52.93	8.67	172120	26.4	
	40	40	52.96	8.70	172225	21.0	
	45	45	53.09	8.83	172348	24.6	
	50	50	53.12	8.86	172452	20.8	
	55	55	53.18	8.92	172562	22.0	
	60	60	53.21	8.95	172675	22.6	

PUMPING TEST RECORD

J. H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

PROJECT NUMBER Q-1014-2 SOUNDER NUMBER 1

TEST TYPE Step drawdown WELL NUMBER #9 pump well

REFERENCE POINT

DATE	TIME		DEPTH TO WATER (FEET)	DRAW DOWN (RECOVERY) (FEET)	PUMPING RATE (METER)	GPM	OBSERVATIONS
	ELAPSED (MIN.)	24 HOUR					
8-19-85	0	60	53.21	8.95	172675		opened valve full
	1	61	45.69	10.43			
	2	62	56.71	12.45			
	3	63	56.87	12.61			
	4	64	56.80	12.54			
	5	65	56.73	12.47		38.0	
	6	66					
	7	67	56.69	12.43			
	8	68	56.76	12.50			
	9	69	56.79	12.53			
	10	70	56.78	12.52	173055		
	12	72	56.96	12.70			
	14	74	56.89	12.63		36.3	
	16	76	56.75	12.49			
	18	78	56.70	12.44			
	20	80	56.95	12.69	173418		
	25	85	56.95	12.69	173598	36.0	
	30	90	56.67	12.41	173778	36.0	
	35	95	56.67	12.41	173947	33.8	
	40	100	56.43	12.17	174116	33.8	
	45	105	56.53	12.27	174268	30.4	
	50	110	56.63	12.37	174430	32.4	

PUMPING TEST RECORD

PROJECT NUMBER Q-1014-2 SOUNDER NUMBER 1

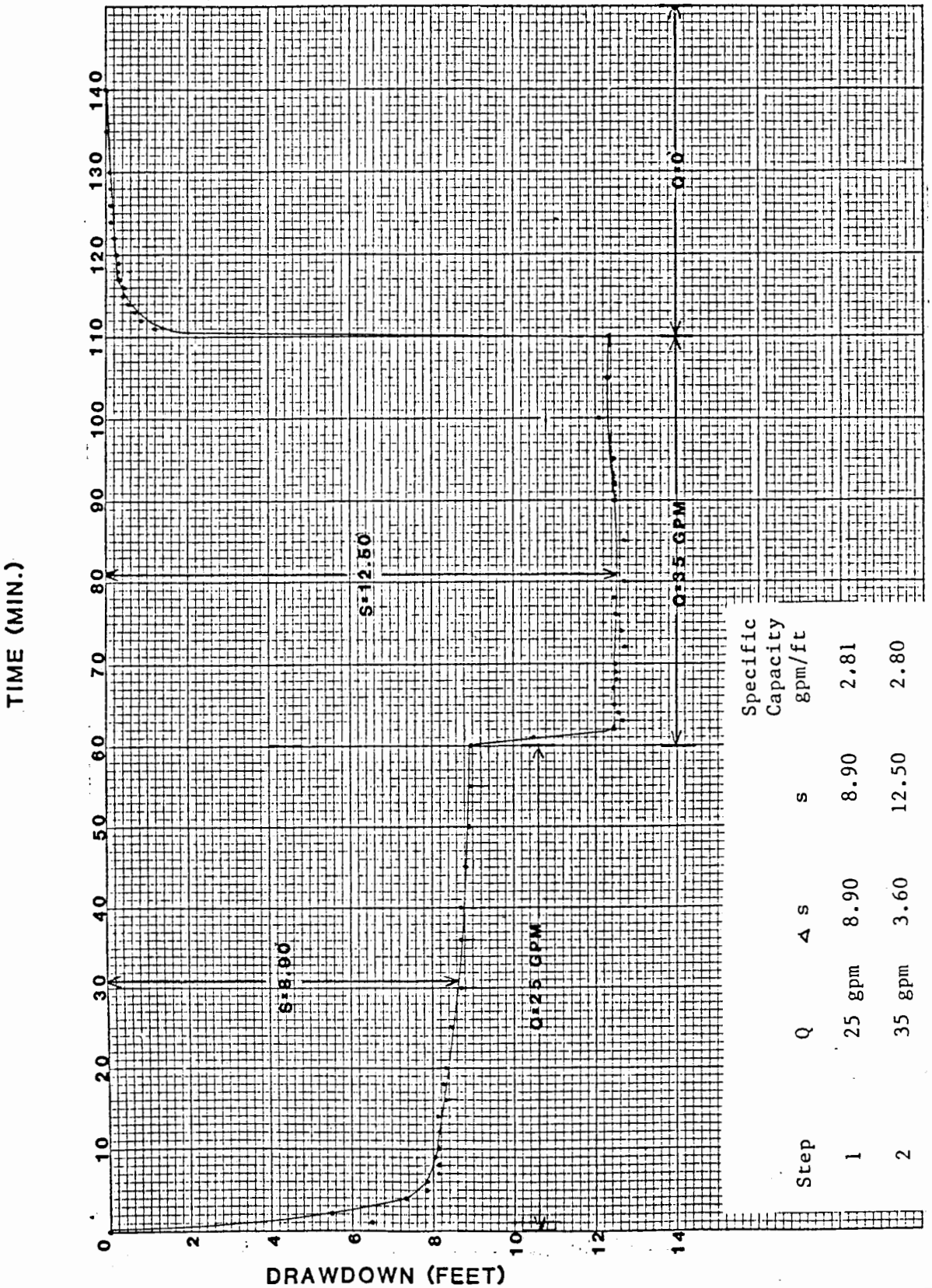
TEST TYPE Recovery WELL NUMBER #9 pumping well

REFERENCE POINT

DATE	TIME		DEPTH TO WATER (FEET)	DRAW DOWN (RECOVERY) (FEET)	PUMPING RATE (GPM)		OBSERVATIONS
	ELAPSED (MIN.)	24 HOUR					
8-19-85	0	110	56.63	0.00	0		pump off
	1	111	45.47	11.16			
	2	112	45.09	11.54			
	3	113	44.99	11.64			
	4	114	44.83	11.80			
	5	115	44.69	11.94			
	6	116	44.70	11.93			
	7	117	44.66	12.03			
	8	118	44.59	12.04			
	9	119	44.55	12.08			
	10	120	44.46	12.07			
	12	122	44.44	12.19			
	14	124	44.38	12.25			
	16	126	44.40	12.23			
	18	128	44.33	12.30			
	20	130	44.29	12.34			
	25	135	44.31	12.32			
	30	140	44.29	12.34			

PUMPING TEST RECORD

J. H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING



Step	Q	Δ s	s	Specific Capacity gpm/ft
1	25 gpm	8.90	8.90	2.81
2	35 gpm	3.60	12.50	2.80

J.H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL & GROUNDWATER CONSULTANTS

Project Number Q1014-1 March 1986

SOUTHERN CALIFORNIA CHEMICAL CO., INC.
SANTA FE SPRINGS, CALIFORNIA
STEP DRAWDOWN TEST

PLATE

PROJECT NUMBER Q-1014-2 SOUNDER NUMBER 2

TEST TYPE Step Drawdown WELL NUMBER MW8

REFERENCE POINT Top of PVC casing

DATE	TIME		DEPTH TO WATER (FEET)	DRAW DOWN (RECOVERY) (FEET)	PUMPING RATE (GPM)		OBSERVATIONS
	ELAPSED (MIN.)	24 HOUR					
8-19-85	0	0	42.62	0.00	Average		
	1	1	42.69	0.07	25 gpm		
	2	2	42.71	0.09			
	3	3	42.71	0.09			
	4	4	42.73	0.11			
	5	5	42.75	0.13			
	6	6	42.75	0.13			
	7	7	42.75	0.13			
	8	8	42.75	0.13			
	9	9	42.79	0.17			
	11	11	42.79	0.17			
	13	13	42.79	0.17			
	15	15	42.81	0.19			
	17	17	42.83	0.21			
	19	19	42.83	0.21			
	24	24	42.83	0.21			
	29	29	42.83	0.21			
	34	34	42.87	0.25			
	39	39	42.90	0.28			
	44	44	42.90	0.28			
	49	49	42.92	0.30			
	54	54	42.92	0.30			
	59	59	42.92	0.30			
	60	60	42.92	0.30			

PUMPING TEST RECORD

J. H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

PROJECT NUMBER Q-1014-2 SOUNDER NUMBER 2

TEST TYPE Step drawdown WELL NUMBER MW-8

REFERENCE POINT

DATE	TIME		DEPTH TO WATER (FEET)	DRAW DOWN (RECOVERY) (FEET)	PUMPING RATE (GPM)		OBSERVATIONS
	ELAPSED (MIN.)	24 HOUR					
8-19-85	0	60	42.92	0.30	Average		
	1	61	42.92	0.30	35 gpm		
	2	62	42.93	0.31			
	3	63	42.93	0.31			
	4	64	42.93	0.31			
	5	65	42.93	0.31			
	6	66	42.93	0.31			
	7	67	42.93	0.31			
	8	68	42.93	0.31			
	9	69	42.93	0.31			
	10	70	42.93	0.31			
	12	72	42.97	0.35			
	14	74	42.99	0.37			
	16	76	43.00	0.38			
	18	78	43.01	0.39			
	20	80	43.01	0.39			
	25	85	43.02	0.40			
	30	90	43.02	0.40			
	35	95	43.02	0.40			
	40	100	43.02	0.40			
	45	105	43.02	0.40			
	50	110	43.03	0.41			

PUMPING TEST RECORD

PROJECT NUMBER Q-1014-2 SOUNDER NUMBER 2

TEST TYPE Recovery WELL NUMBER MW 8

REFERENCE POINT

DATE	TIME		DEPTH TO WATER (FEET)	DRAW DOWN (RECOVERY) (FEET)	PUMPING RATE (GPM)		OBSERVATIONS
	ELAPSED (MIN.)	24 HOUR					
8-19-85	0	110	43.03	0.00			Pump Off
	1	111	43.02	0.01			
	2	112	43.00	0.03			
	3	113	43.00	0.03			
	4	114	42.98	0.05			
	5	115	42.96	0.07			
	6	116	42.94	0.09			
	7	117	42.93	0.10			
	8	118	42.92	0.11			
	9	119	42.90	0.13			
	10	120	42.90	0.13			
	12	122	42.88	0.15			
	14	124	42.86	0.17			
	16	126	42.85	0.18			
	18	128	42.83	0.20			
	20	130	42.82	0.21			
	25	135	42.78	0.25			
	30	140	42.77	0.26			

PUMPING TEST RECORD

J. H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

PROJECT NUMBER 0-1014-2 SOUNDER NUMBER 3

TEST TYPE Step drawdown WELL NUMBER MW 10

REFERENCE POINT Top of PVC casing

DATE	TIME		DEPTH TO WATER (FEET)	DRAW DOWN (RECOVERY) (FEET)	PUMPING RATE (GPM)		OBSERVATIONS
	ELAPSED (MIN.)	24 HOUR					
	0	0	44.66				
8-19-85	1	1	44.62				
	2	2	44.70				
	3	3	45.33				
	4	4	44.78				
	5	5	44.79				
	6	6	44.80				
	7	7	44.81				
	8	8	44.83				
	9	9	44.86				
	10	10	45.10				
	12	12	45.10				
	14	14	45.00				
	16	16	45.01				
	18	18	45.03				
	20	20	45.24				
	25	25	44.91				
	30	30	44.99				
	35	35	45.43				
	40	40	45.71				
	45	45	45.70				
	50	50	45.42				
	55	55	45.17				
	60	60	45.24				

PUMPING TEST RECORD

J. H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

PROJECT NUMBER Q-1014-2 SOUNDER NUMBER 3

TEST TYPE Step drawdown WELL NUMBER MW 10

REFERENCE POINT

DATE	TIME		DEPTH TO WATER (FEET)	DRAW DOWN (RECOVERY) (FEET)	PUMPING RATE (GPM)		OBSERVATIONS
	ELAPSED (MIN.)	24 HOUR					
8-19-85	0	60	45.24				
	1	61	45.51				
	2	62	45.41				
	3	63	45.54				
	4	64	45.35				
	5	65	45.42				
	6	66	45.45				
	7	67	45.31				
	8	68	45.23				
	9	69	45.49				
	10	70	45.61				
	12	72	45.42				
	14	74	45.22				
	16	76	45.42				
	18	78	45.70				
	20	80	45.30				
	25	85	45.72				
	30	90	45.89				
	35	95	46.47				
	40	100	46.34				
	45	105	46.03				
	50	110	45.18				

PUMPING TEST RECORD

J. H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

SHEET ____ OF ____

PROJECT NUMBER 0-1014-2 SOUNDER NUMBER 3

TEST TYPE Recovery WELL NUMBER MW 10

REFERENCE POINT

DATE	TIME		DEPTH TO WATER (FEET)	DRAW DOWN (RECOVERY) (FEET)	PUMPING RATE (GPM)		OBSERVATIONS
	ELAPSED (MIN.)	24 HOUR					
8-19-85	0	110					
	1	111	45.23				
	2	112	45.23				
	3	113	45.64				
	4	114	46.40				
	5	115	46.75				
	6	116	45.74				
	7	117	45.48				
	8	118	45.78				
	9	119	44.99				
	10	120	45.21				
	12	122	45.17				
	14	124	45.24				
	16	126	44.96				
	18	128	45.41				
	20	130	44.98				

PUMPING TEST RECORD

J. H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

PROJECT NUMBER Q-1014-2 SOUNDER NUMBER #2

TEST TYPE Pump Test WELL NUMBER #9 Pumping well

REFERENCE POINT top of 5/8" thick plate on top of rim

DATE	TIME		DEPTH TO WATER (FEET)	DRAW DOWN (RECOVERY) (FEET)	PUMPING RATE		OBSERVATIONS
	ELAPSED (MIN.)	24 HOUR				GPM	
8-29-95							
		9:00am	44.90				
	0		44.89	0			
	1		49.21	4.32			
	2		51.18	6.29			
	3		53.65	8.76			
	4		53.65	8.76			
	5		55.60	10.71			
	6		54.36	9.47			
	7		54.34	9.45			
	8		56.03	11.14			
	9		56.53	11.64			
	10		56.75	11.86		32.8	
	12		56.65	11.76			
	14		56.62	11.73		34.2	
	16		56.47	11.58			
	18		56.46	11.57			
	20		56.43	11.54		35.6	
	25		56.54	11.65		36.6	
	30		56.65	11.76		32.2	
	35		56.65	11.76		35.0	
	40		56.65	11.76		32.4	
	45		56.68	11.79		30.0	
	50		56.64	11.75		31.2	
	55		56.67	11.78		32.4	
	60		56.78	11.89		29.0	
	70		56.53	11.64		30.5	
	80		56.54	11.65		28.9	
	90		56.46	11.57		27.5	

PUMPING TEST RECORD

J. H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

PROJECT NUMBER Q-1014-2 SOUNDER NUMBER _____

TEST TYPE _____ WELL NUMBER #9 pumping well

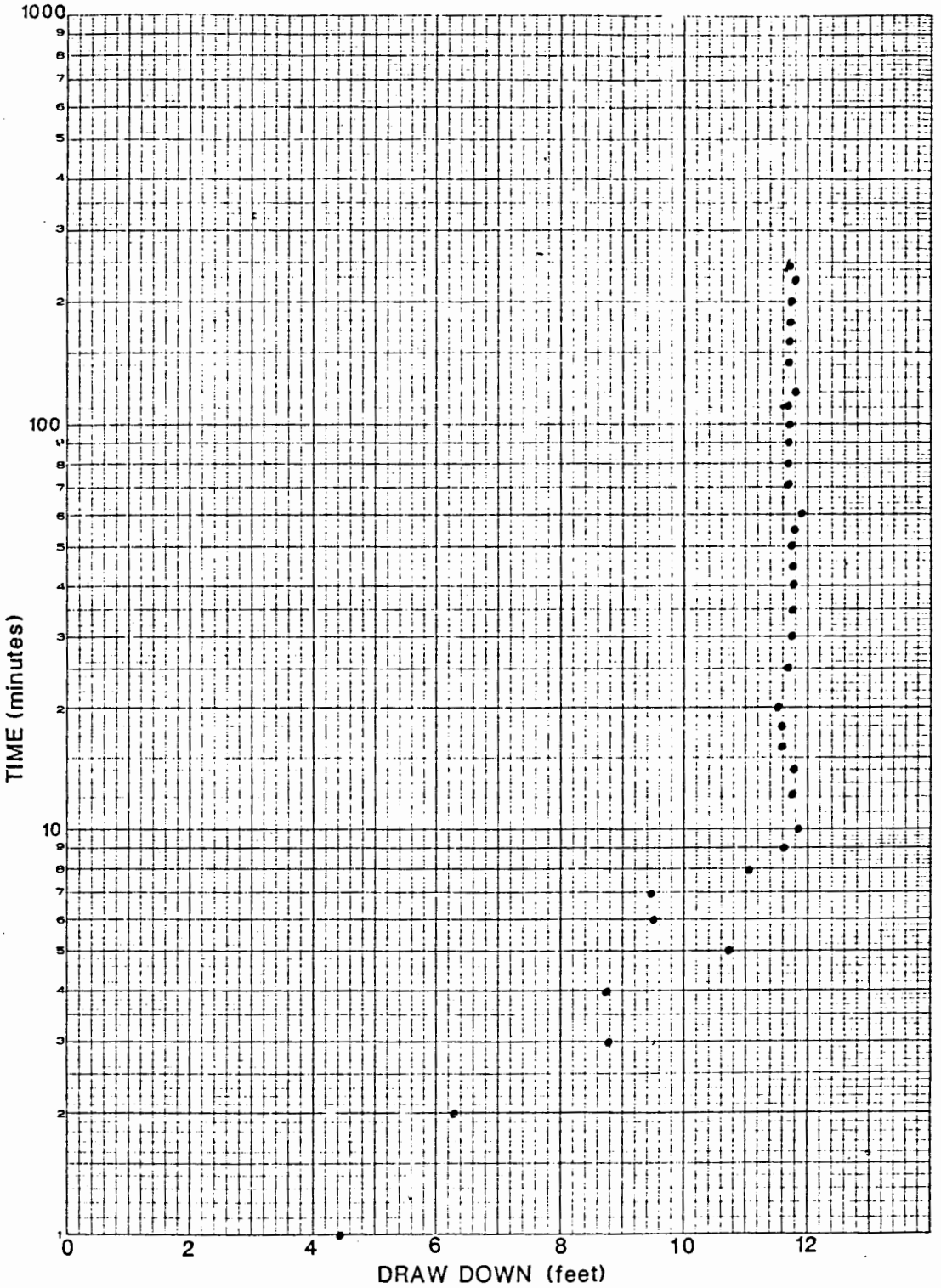
REFERENCE POINT _____

DATE	TIME		DEPTH TO WATER (FEET)	DRAW DOWN (RECOVERY) (FEET)	PUMPING RATE		OBSERVATIONS
	ELAPSED (MIN.)	24 HOUR				GPM	
8-29-95	100		56.64	11.75		28.7	
	110		56.49	11.60		26.6	
	120		56.65	11.76		27.7	
	140		56.58	11.69		31.5	
	160		56.56	11.67		25.2	
	180		56.64	11.75		25.2	
	200		56.50	11.66			
	220		56.70	11.81		21.7	
	240		56.64	11.74		24.5	
	260		56.56	11.67			

PUMPING TEST RECORD

J. H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

SHEET ____ OF ____



J.H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL & GROUNDWATER CONSULTANTS

Project Number Q1014-1 March 1986

SOUTHERN CALIFORNIA CHEMICAL CO., INC.
SANTA FE SPRINGS, CALIFORNIA
PUMPING WELL
DRAWDOWN MW 9

PLATE

PROJECT NUMBER Q-1014-2 SOUNDER NUMBER 1

TEST TYPE Pump Test WELL NUMBER MW 8

REFERENCE POINT

DATE	TIME		DEPTH TO WATER (FEET)	DRAW DOWN (RECOVERY) (FEET)	PUMPING RATE (GPM)		OBSERVATIONS
	ELAPSED (MIN.)	24 HOUR					
8-29-85		9:30	43.33				
	0	9:40	43.33	0			
	1		43.33	0			
	2		43.36	0.03			
	3		43.40	0.07			
	4		43.41	0.08			
	5		43.39	0.06			
	6		43.46	0.13			
	7		43.46	0.13			
	8		43.48	0.15			
	9		43.49	0.16			
	10		43.49	0.16			
	12		43.53	0.20			
	14		43.54	0.21			
	16		43.55	0.22			
	18		43.56	0.23			
	20		43.56	0.23			
	25		43.55	0.22			
	30		43.62	0.22			
	35		43.64	0.31			
	40		43.64	0.31			
	45		43.64	0.31			
	50		43.64	0.31			
	55		43.64	0.31			
	60		43.66	0.33			
	70		43.67	0.34			
	80		43.67	0.34			
	90		46.66	0.33			

PUMPING TEST RECORD

J. H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

PROJECT NUMBER Q-1014-2 SOUNDER NUMBER 1

TEST TYPE Pump Test WELL NUMBER #8

REFERENCE POINT

DATE	TIME		DEPTH TO WATER (FEET)	DRAW DOWN (RECOVERY) (FEET)	PUMPING RATE (GPM)		OBSERVATIONS
	ELAPSED (MIN.)	24 HOUR					
	100		43.67	0.34			
	110		43.67	0.34			
	120		43.66	0.33			
	140		43.66	0.33			
	160		43.66	0.33			
	180		43.66	0.33			
	200		43.66	0.33			
	220		43.65	0.32			
	240		43.64	0.31			
	250		43.63	0.30			

PROJECT NUMBER Q-1014-2 SOUNDER NUMBER #1

TEST TYPE Pump Test-recovery WELL NUMBER #8

REFERENCE POINT

DATE	TIME		DEPTH TO WATER (FEET)	DRAW DOWN (RECOVERY) (FEET)	PUMPING RATE (GPM)		OBSERVATIONS
	ELAPSED (MIN.)	24 HOUR					
	0		43.63	0.00			
	1	1350	43.61	0.02			
	2		43.62	0.01			
	3		43.60	0.03			
	4		43.59	0.04			
	5		43.56	0.07			
	6		43.52	0.09			
	7		43.52	0.11			
	8		43.51	0.12			
	9		43.51	0.12			
	10		43.50	0.13			
	12		43.49	0.14			
	14		43.48	0.15			
	16		43.48	0.15			
	18		43.46	0.17			
	20		43.46	0.17			
	25		43.44	0.19			
	30		43.43	0.20			
	35		43.43	0.20			
	40		43.40	0.23			
	45		43.40	0.23			
	50		43.39	0.24			
	55		43.39	0.24			
	60		43.38	0.25			
	70		43.37	0.26			
	80		43.36	0.27			
	90		43.35	0.28			
	100		43.35	0.28			
	110		43.34	0.29			
	120		43.34	0.29			

PROJECT NUMBER Q-1014-2 SOUNDER NUMBER 1

TEST TYPE Pump Test WELL NUMBER MW 8

REFERENCE POINT

DATE	TIME		DEPTH TO WATER (FEET)	DRAW DOWN (RECOVERY) (FEET)	PUMPING RATE (GPM)		OBSERVATIONS
	ELAPSED (MIN.)	24 HOUR					
8-29-85		9:30	43.33				
	0	9:40	43.33	0			
	1		43.33	0			
	2		43.36	0.03			
	3		43.40	0.07			
	4		43.41	0.08			
	5		43.39	0.06			
	6		43.46	0.13			
	7		43.46	0.13			
	8		43.48	0.15			
	9		43.49	0.16			
	10		43.49	0.16			
	12		43.53	0.20			
	14		43.54	0.21			
	16		43.55	0.22			
	18		43.56	0.23			
	20		43.56	0.23			
	25		43.55	0.22			
	30		43.62	0.22			
	35		43.64	0.31			
	40		43.64	0.31			
	45		43.64	0.31			
	50		43.64	0.31			
	55		43.64	0.31			
	60		43.66	0.33			
	70		43.67	0.34			
	80		43.67	0.34			
	90		46.66	0.33			

PUMPING TEST RECORD

J. H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

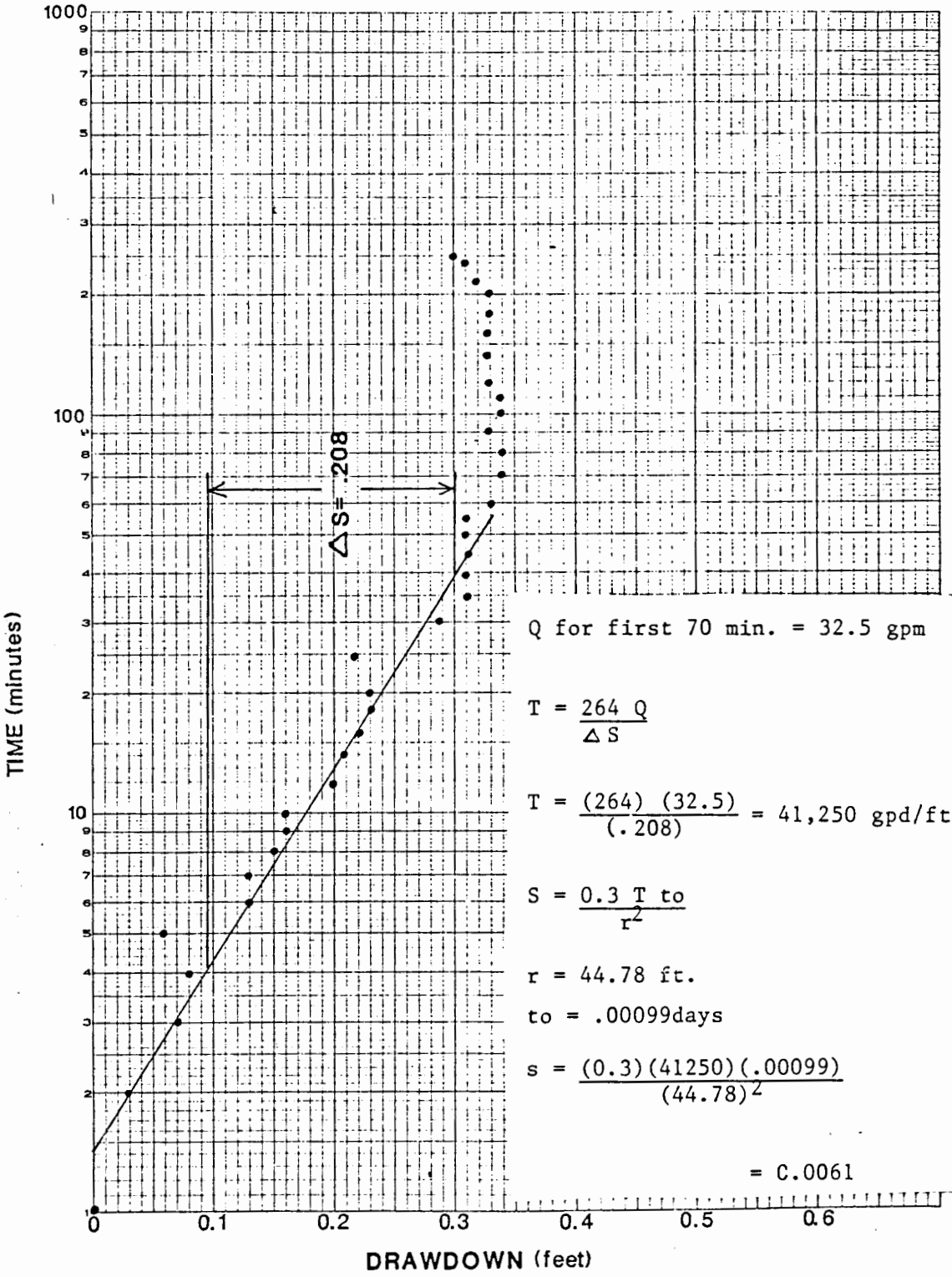
PROJECT NUMBER Q-1014-2 SOUNDER NUMBER 1

TEST TYPE Pump Test WELL NUMBER #8

REFERENCE POINT

DATE	TIME		DEPTH TO WATER (FEET)	DRAW DOWN (RECOVERY) (FEET)	PUMPING RATE (GPM)		OBSERVATIONS
	ELAPSED (MIN.)	24 HOUR					
	100		43.67	0.34			
	110		43.67	0.34			
	120		43.66	0.33			
	140		43.66	0.33			
	160		43.66	0.33			
	180		43.66	0.33			
	200		43.66	0.33			
	220		43.65	0.32			
	240		43.64	0.31			
	250		43.63	0.30			

PUMPING TEST RECORD



Q for first 70 min. = 32.5 gpm

$$T = \frac{264\ Q}{\Delta S}$$

$$T = \frac{(264)\ (32.5)}{(.208)} = 41{,}250 \text{ gpd/ft}$$

$$S = \frac{0.3\ T\ to}{r^2}$$

r = 44.78 ft.

to = .00099days

$$s = \frac{(0.3)(41250)(.00099)}{(44.78)^2}$$

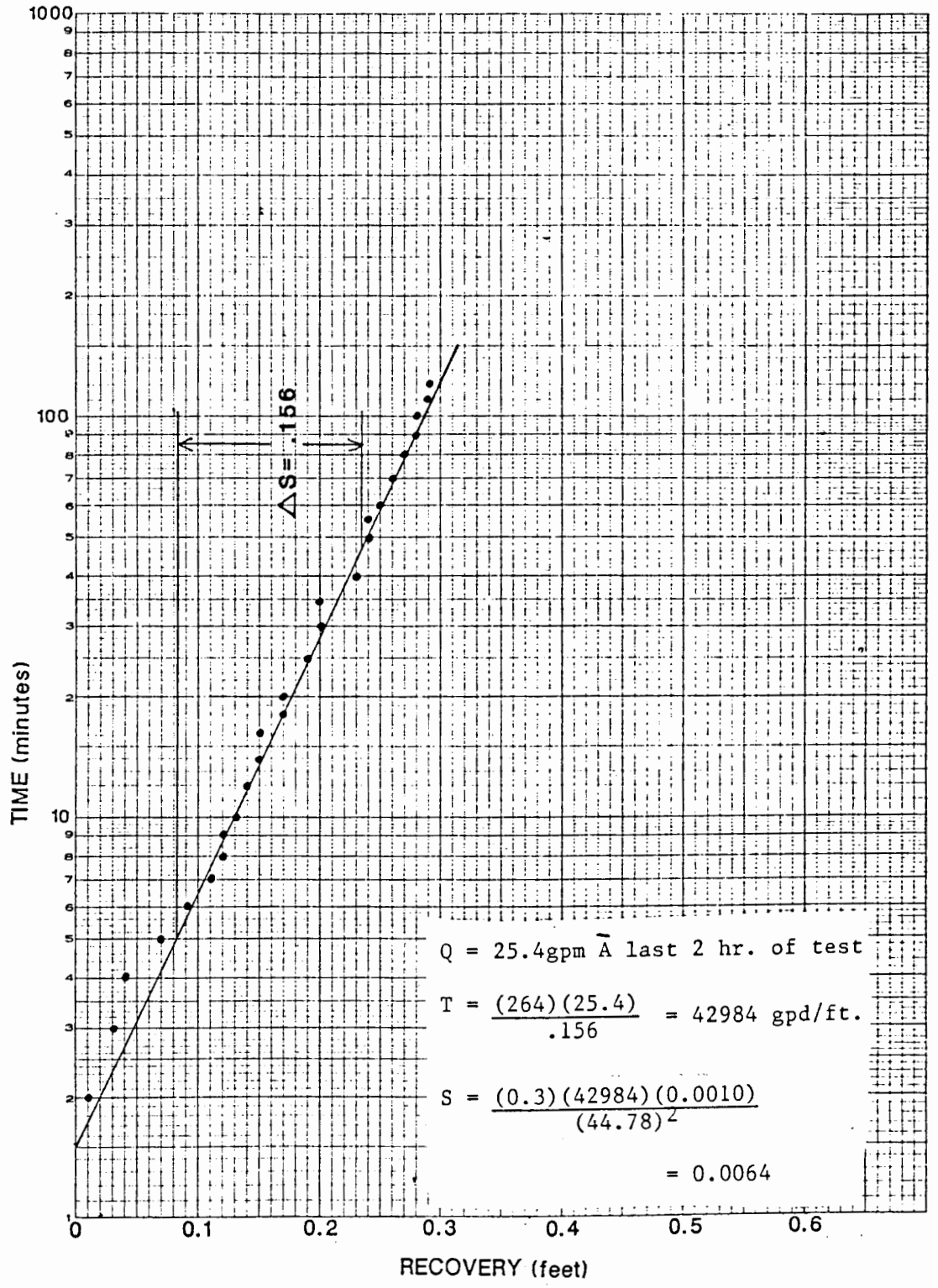
= C.0061

J.H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL & GROUNDWATER CONSULTANTS

Project Number Q1014-2 March 1986

SOUTHERN CALIFORNIA CHEMICAL CO., INC.
SANTA FE SPRINGS, CALIFORNIA
JACOB-COOPER APPROXIMATION
DRAWDOWN MW 8

PLATE

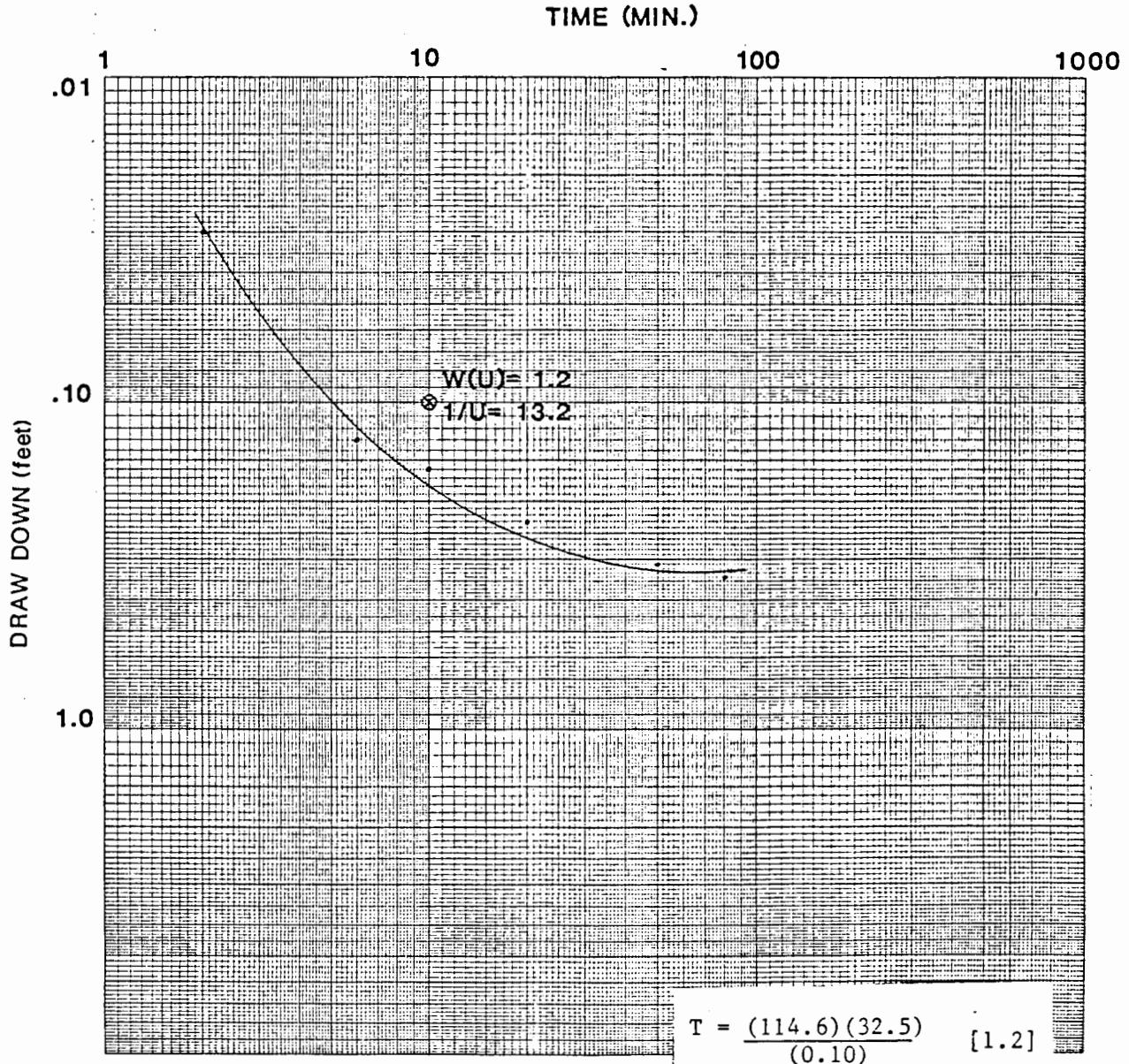


J.H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL & GROUNDWATER CONSULTANTS

Project Number Q1014-2 March 1986

SOUTHERN CALIFORNIA CHEMICAL CO., INC.
SANTA FE SPRINGS, CALIFORNIA
JACOB-COOPER APPROXIMATION
RECOVERY MW 8

PLATE



$$T = \frac{(114.6)(32.5)}{(0.10)} \quad [1.2]$$

$$= 44694 \text{ gpd/ft.}$$

$$S = \frac{(0.076)(44694)(.0069)}{(1.87)(44.78)^2}$$

$$= .0062$$

J.H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL & GROUNDWATER CONSULTANTS

Project Number Q1014-2 MARCH 1986

SOUTHERN CALIFORNIA CHEMICAL CO., INC
SANTA FE SPRINGS, CALIFORNIA
THEIS CURVE MATCHING
DRAWDOWN MW 8

PLATE

PROJECT NUMBER Q-1014-2 SOUNDER NUMBER 3

TEST TYPE Pump Test WELL NUMBER MW #10

REFERENCE POINT

DATE	TIME		DEPTH TO WATER (FEET)	DRAW DOWN (RECOVERY) (FEET)	PUMPING RATE (GPM)		OBSERVATIONS
	ELAPSED (MIN.)	24 HOUR					
9/29/85							
Start Recovery @ 1:51 p.m.							
	0		45.75	0.00			
	1		45.73	0.02			
	2		45.67	0.08			
	3		45.63	0.12			
	4		45.60	0.15			
	5		45.57	0.18			
	6		45.57	0.18			
	7		45.56	0.19			
	8		45.55	0.20			
	9		45.55	0.20			
	10		45.54	0.21			
	12		45.53	0.22			
	14		45.52	0.23			
	16		45.52	0.23			
	18		45.51	0.24			
	20		45.50	0.25			
	25		45.48	0.27			
	30		45.47	0.28			
	35		45.45	0.30			
	40		45.44	0.31			
	45		45.43	0.32			
	50		45.42	0.33			
	55		45.41	0.34			
	60		45.40	0.35			
	70		45.40	0.35			
	80		45.39	0.36			
	90		45.39	0.36			

PUMPING TEST RECORD

J. H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

SHEET ____ OF ____

PROJECT NUMBER Q-1014-2 SOUNDER NUMBER _____

TEST TYPE Recovery WELL NUMBER MW 10

REFERENCE POINT _____

DATE	TIME		DEPTH TO WATER (FEET)	DRAW DOWN (RECOVERY) (FEET)	PUMPING RATE (GPM)		OBSERVATIONS
	ELAPSED (MIN.)	24 HOUR					
	100		45.38	0.37			
	110		45.37	0.38			
	120		45.37	0.38			
	140						
	160						
	180						
	200						
	240						
	270						
	300						

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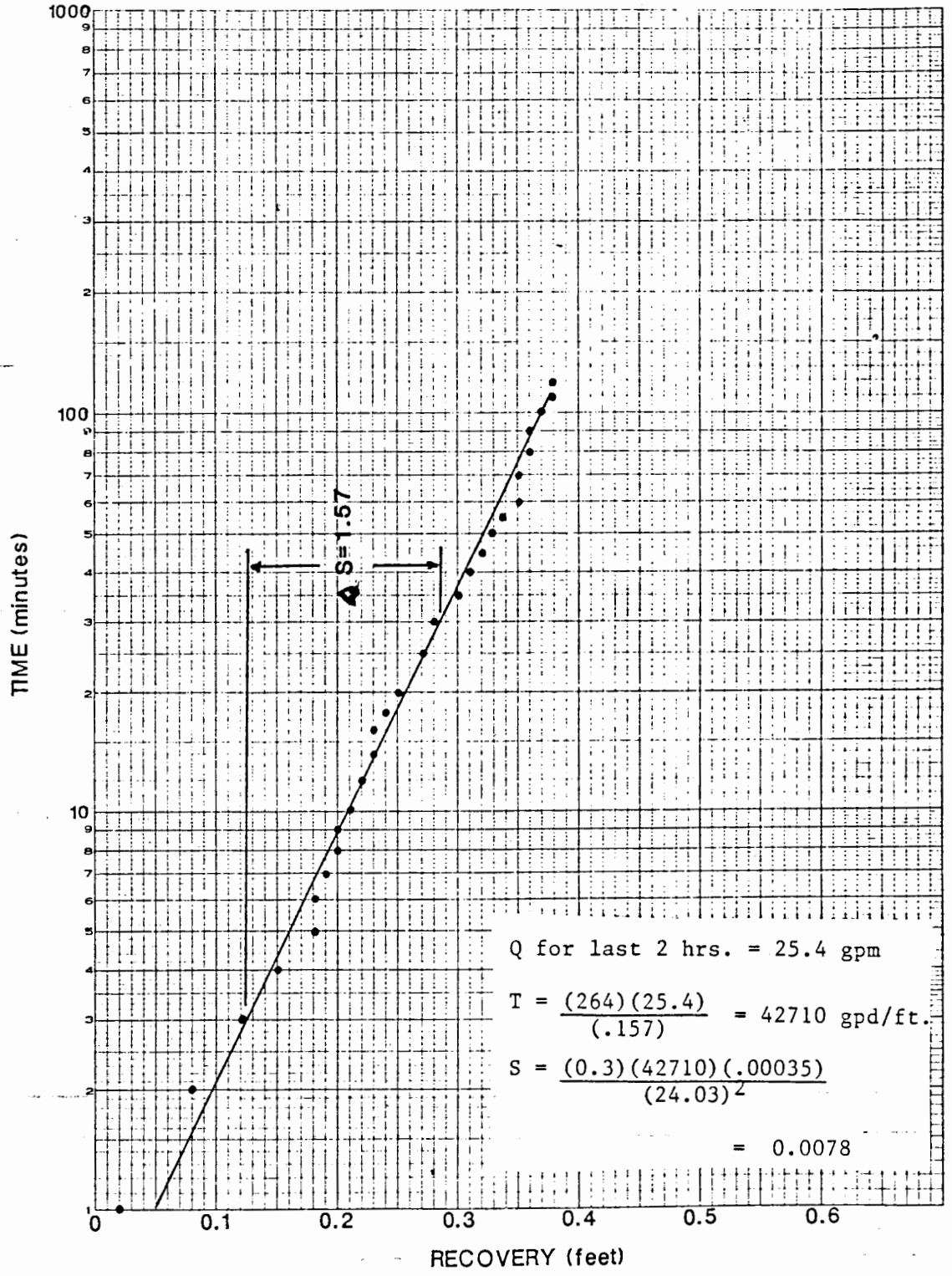
PUMPING TEST RECORD

SHEET ____ OF ____



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GEOTECHNICAL & GROUNDWATER CONSULTANTS

Project Number Q1014-2 March 1986

SOUTHERN CALIFORNIA CHEMICAL CO., INC.
SANTA FE SPRINGS, CALIFORNIA
JACOB-COOPER APPROXIMATED
RECOVERY MW 10

PLATE

PROJECT NUMBER Q-1014-2 SOUNDER NUMBER _____

TEST TYPE Pump test WELL NUMBER MW 10

REFERENCE POINT _____

DATE	TIME		DEPTH TO WATER (FEET)	DRAW DOWN (RECOVERY) (FEET)	PUMPING RATE (GPM)		OBSERVATIONS
	ELAPSED (MIN.)	24 HOUR					
		9:01	45.33				
8-29-85	0		45.35	0			
	1		45.39	0.04			
	2		45.45	0.10			
	3		45.50	0.15			
	4		45.53	0.18			
	5		45.57	0.22			
	6		45.59	0.24			
	7		45.60	0.25			
	8		45.62	0.27			
	9		45.64	0.29			
	10		45.65	0.30			
	12		45.66	0.31			
	14		45.67	0.32			
	16		45.69	0.34			
	18		45.71	0.36			
	20		45.74	0.39			
	25		45.77	0.42			
	30		45.78	0.43			
	35		45.79	0.44			
	40		45.80	0.45			
	45		45.81	0.45			
	50		45.81	0.46			
	55		45.81	0.46			
	60		45.81	0.46			
	70		45.81	0.46			
	80		45.82	0.47			
	90		45.82	0.47			

PUMPING TEST RECORD

J. H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

SHEET ____ OF ____

PROJECT NUMBER Q-1014-2 SOUNDER NUMBER _____

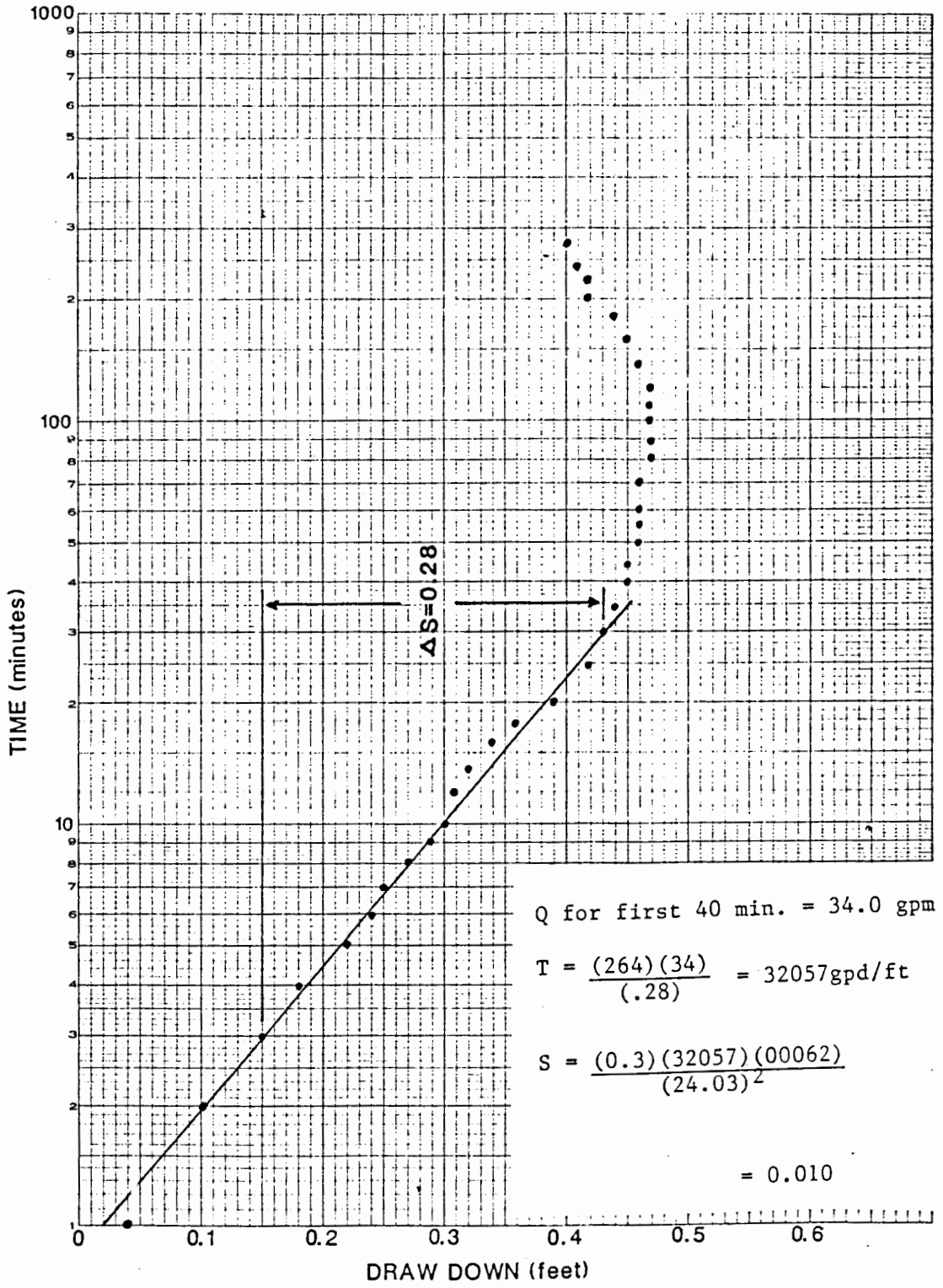
TEST TYPE Pump test WELL NUMBER MW 10

REFERENCE POINT _____

DATE	TIME		DEPTH TO WATER (FEET)	DRAW DOWN (RECOVERY) (FEET)	PUMPING RATE (GPM)		OBSERVATIONS
	ELAPSED (MIN.)	24 HOUR					
8-29-85	100	45.82	0.47				
	110	45.82	0.47				
	120	45.82	0.47				
	140	45.81	0.46				
	160	45.80	0.45				
	180	45.79	0.44				
	200	45.77	0.42				
	220	45.77	0.42				
	240	45.76	0.41				
	270	45.75	0.40				
	300						

PUMPING TEST RECORD

J. H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING



Q for first 40 min. = 34.0 gpm

$$T = \frac{(264)(34)}{(.28)} = 32057 \text{gpd/ft}$$

$$S = \frac{(0.3)(32057)(00062)}{(24.03)^2}$$

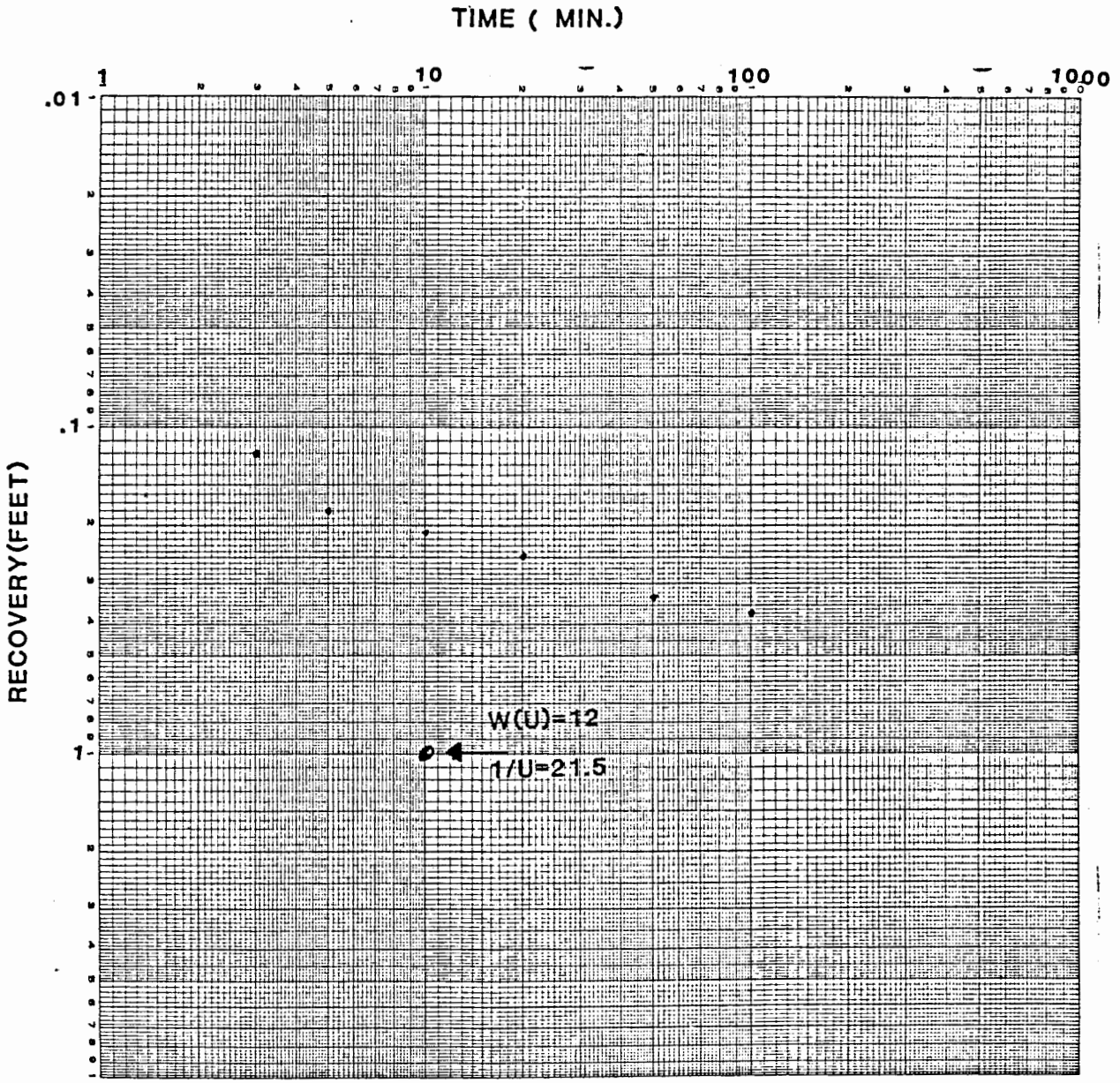
$$= 0.010$$

J.H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL & GROUNDWATER CONSULTANTS

Project Number Q1014-2 March 1986

SOUTHERN CALIFORNIA CHEMICAL CO., INC.
SANTA FE SPRINGS, CALIFORNIA
JACOB COOPER APPROXIMATION
DRAWDOWN MW 10

PLATE



$$T = \frac{(114.6)(25.4)}{1} \quad (12)$$

$$= 34930 \text{ gpd/ft.}$$

$$S = \frac{(.046)(34930)(0.0069)}{(1.87)(24.03)^2}$$

$$= 0.010$$

J.H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL & GROUNDWATER CONSULTANTS

Project Number

SOUTHERN CALIFORNIA CHEMICAL CO., INC.
SANTA FE SPRINGS, CALIFORNIA
THEIS CURVE MATCHING
RECOVERY MW 10

PLATE

PROJECT NUMBER Q-1014-2 SOUNDER NUMBER _____

TEST TYPE Pumping Test WELL NUMBER MW 4

REFERENCE POINT T.O.C. (south side)

DATE	TIME		DEPTH TO WATER (FEET)	DRAW DOWN (RECOVERY) (FEET)	PUMPING RATE (GPM)		OBSERVATIONS
	ELAPSED (MIN.)	24 HOUR					
		9:00	43.78				
8-29-85	0	09:41	43.78				
	1		43.81	.03			
	2		43.82	.04			
	3		43.84	.06			
	4		43.85	.07			
	5		43.83	.05			
	6		43.83	.05			
	7		43.83	.05			
	8		43.92	.04			
	9		43.82	.04			
	10		43.82	.04			
	12		43.82	.04			
	14		43.83	.05			
	16		43.83	.05			
	18		43.83	.05			
	20		43.83	.05			
	25		43.84	.06			
	30		43.84	.06			
	35		43.86	.08			
	40		43.88	.10			
	45		43.89	.11			
	50		43.90	.12			
	55		43.90	.12			
	60		43.91	.13			
	70		43.92	.14			
	80		43.94	.16			
	90		43.96	.18			

PUMPING TEST RECORD

J. H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

PROJECT NUMBER Q-1014-2 SOUNDER NUMBER 1

TEST TYPE Pumping WELL NUMBER MW 4

REFERENCE POINT T.O.C. Southside

DATE	TIME		DEPTH TO WATER (FEET)	DRAW DOWN (FEET)	RECOVERY (feet)		OBSERVATIONS
	ELAPSED (MIN.)	24 HOUR					
8-29-85	100		43.96	0.18			
	110		43.97	0.19			
	120		43.97	0.19			
	140		43.98	0.20			
	160		43.99	0.21			
	180		43.99	0.21			
	200		43.99	0.21			
	220		43.99	0.21			
	240		43.99	0.21			
	250		43.99	0.21	0.00		Shut down pump
	251		43.99	0.21	0.00		
	252		43.98	0.20	0.01		
	253		43.91				
	254		43.97	0.19	0.02		
	255		43.97	0.19	0.02		
	256		43.96	0.18	0.03		
	257		43.97	0.19	0.02		
	258		43.97	0.19	0.02		
	259		43.97	0.19	0.02		
	260		43.96	0.18	0.03		
	262		43.97	0.19	0.02		
	264		43.96	0.18	0.03		
	266		43.97	0.19	0.02		
	268		43.96	0.18	0.03		
	270		43.97	0.19	0.02		
	275		43.96	0.18	0.03		
	280		43.95	0.17	0.04		
	285		43.95	0.17	0.04		
	290		43.94	0.16	0.05		

PUMPING TEST RECORD

PROJECT NUMBER Q-1014-2 SOUNDER NUMBER _____

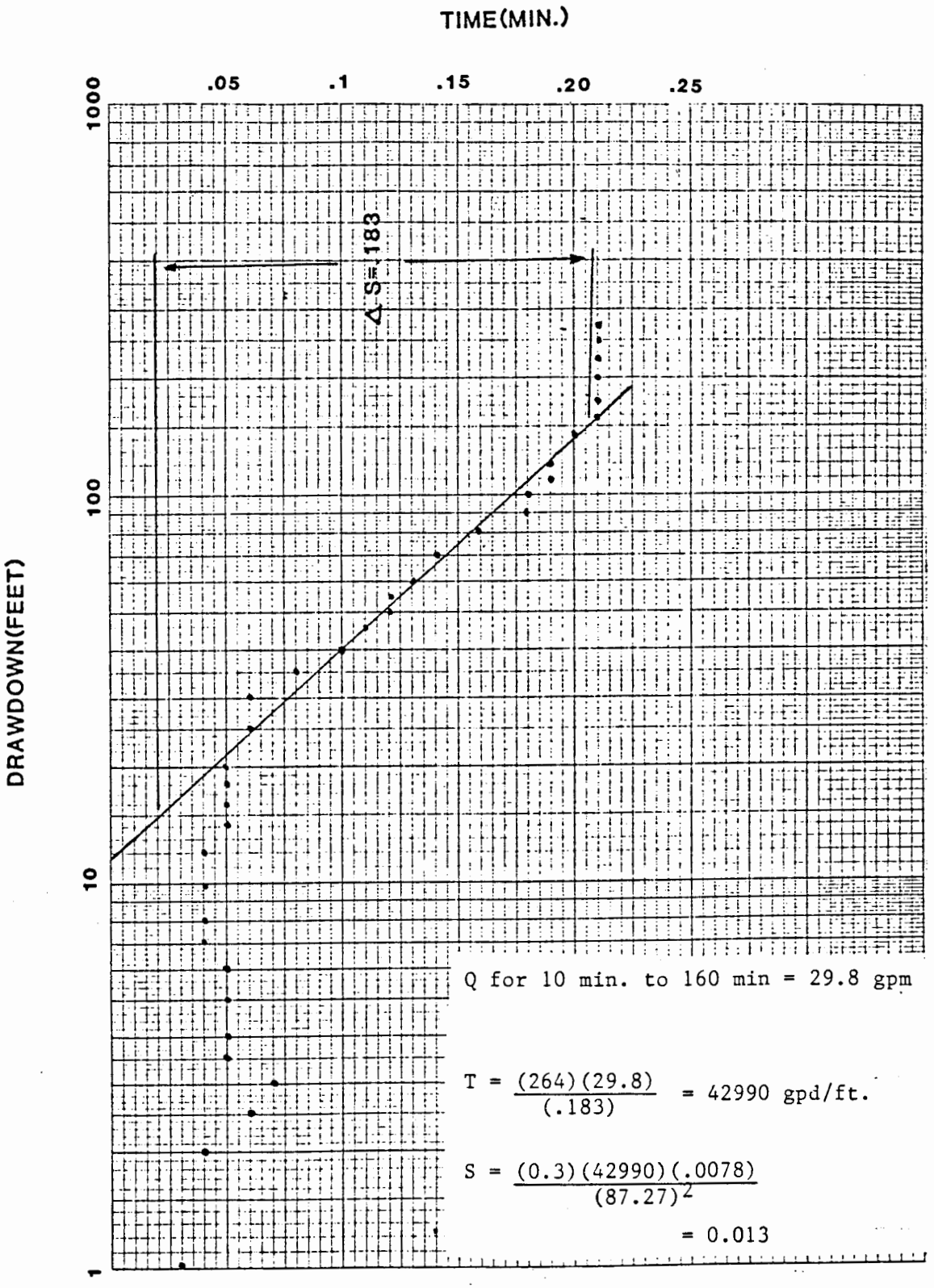
TEST TYPE Pump test WELL NUMBER MW 4

REFERENCE POINT _____

DATE	TIME		DEPTH TO WATER (FEET)	DRAW DOWN (FEET)	RECOVERY (feet)		OBSERVATIONS
	ELAPSED (MIN.)	24 HOUR					
8-29-85	295		43.91	0.13	0.08		
	300		43.91	0.13	0.08		
	305		43.90	0.12	0.09		
	310		43.90	0.12	0.09		
	320		43.89	0.11	0.10		
	330		43.87	0.09	0.12		
	340		43.86	0.08	0.13		
	350		43.85	0.07	0.14		
	360		43.85	0.07	0.14		
	370		43.83	0.05	0.16		
	390						

PUMPING TEST RECORD

J. H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING



Q for 10 min. to 160 min = 29.8 gpm

$$T = \frac{(264)(29.8)}{(.183)} = 42990 \text{ gpd/ft.}$$

$$S = \frac{(0.3)(42990)(.0078)}{(87.27)^2}$$

$$= 0.013$$

J.H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL & GROUNDWATER CONSULTANTS

Project Number Q1014-2 MARCH 1986

SOUTHERN CALIFORNIA CHEMICAL CO., INC.
SANTA FE SPRINGS, CALIFORNIA
JACOB-COOPER APPROXIMATION
DRAWDOWN MW 4

PLATE

APPENDIX D

LITHOLOGIC LOGS

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS		LTR	DESCRIPTION	MAJOR DIVISIONS		LTR	DESCRIPTION
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	GW	Well-graded gravels or gravel sand mixtures, little or no fines.	FINE GRAINED SOILS	SILTS AND CLAYS LL<50	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
		GP	Poorly-graded gravels or gravel sand mixture, little or no fines.			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
		GM	Silty gravels, gravel-sand-clay mixtures.			OL	Organic silts and organic silt-clays of low plasticity
		GC	Clayey gravels, gravel-sand-clay mixtures.		SILTS AND CLAYS LL>50	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
	SAND AND SANDY SOILS	SW	Well-graded sands or gravelly sands, little or no fines.			CH	Inorganic clays of high plasticity, fat clays.
		SP	Poorly-graded sands or gravelly sands, little or no fines.			OH	Organic clays of medium to high plasticity.
		SM	Silty sands, sand-silt mixtures.	HIGHLY ORGANIC SOILS		Pt	Peat and other highly organic soils.
		SC	Clayey sands, sand-clay mixtures.				


Standard penetration split spoon sample


Modified California sampler


Shelby tube sample

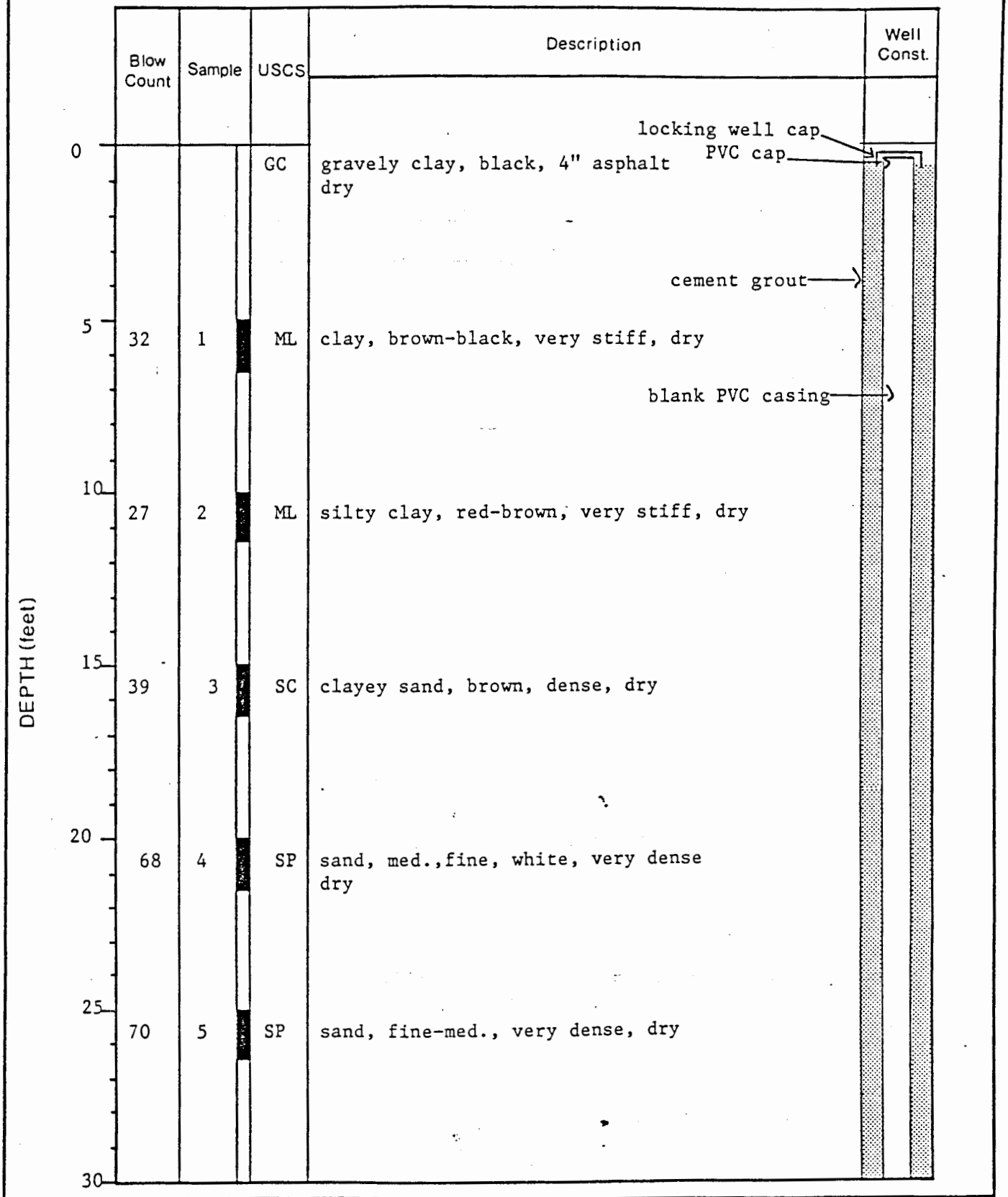

Water level observed in boring

* No recovery

NFWE No free water encountered

NOTE: The lines separating strata on the logs represent approximate boundaries only. The actual transition may be gradual. No warranty is provided as to the continuity of soil strata between borings. Logs represent the soil section observed at the boring location on the date of drilling only.

J.H. KLEINFELDER & ASSOCIATES GEOTECHNICAL CONSULTANTS • MATERIALS TESTING	BORING LOG LEGEND	PLATE 4
PREPARED BY: DATE:		
CHECKED BY: DATE:	PROJECT NO.	



J.H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

So. Calif. Chemical
Santa Fe Springs, Ca.

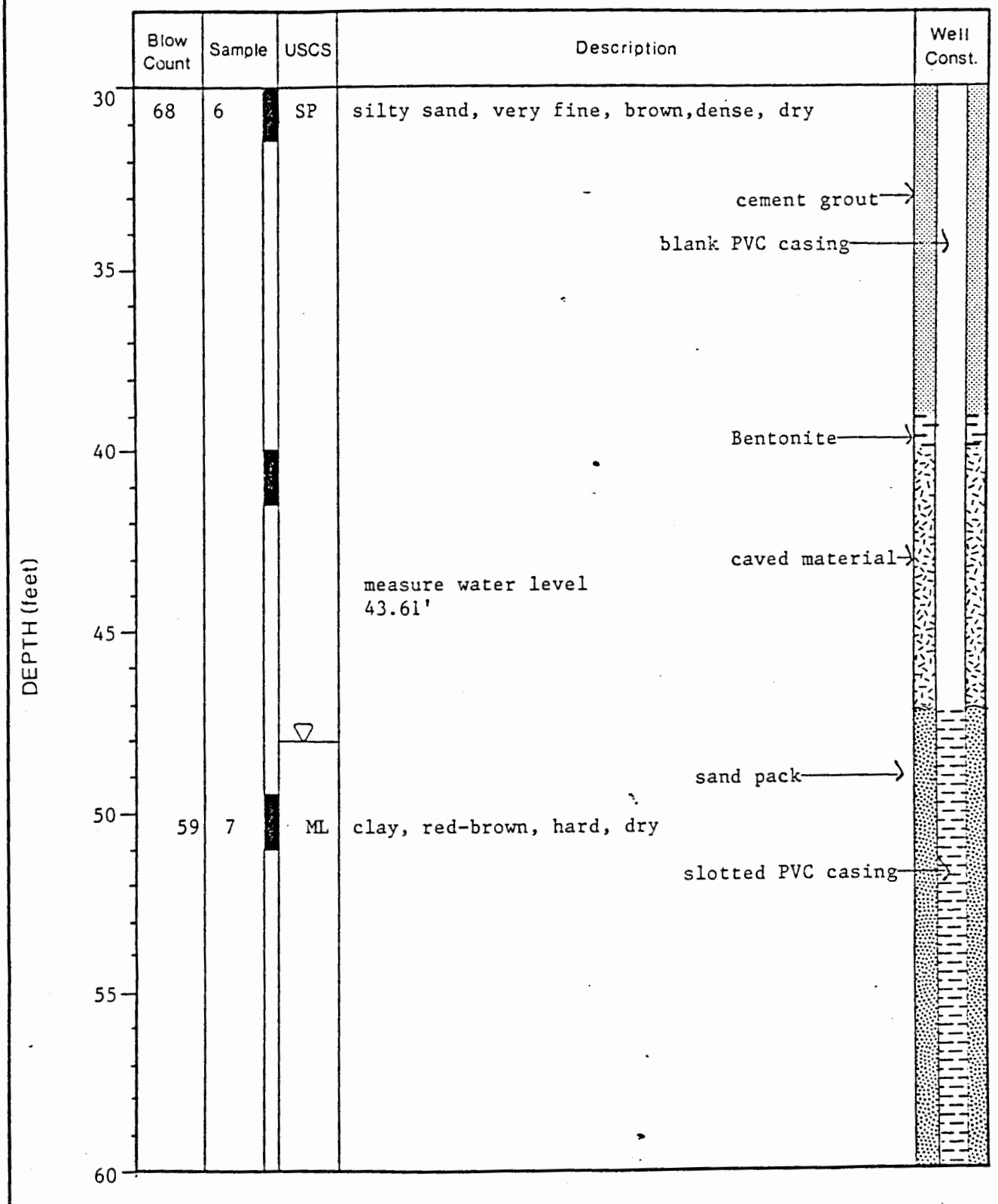
LOG of BORING MW-1

PLATE 5

PREPARED BY: JF DATE: 5/85

CHECKED BY: DATE:

PROJECT NO. Q-1014-1



J.H. KLEINFELDER & ASSOCIATES
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Santa Fe Springs, Ca.

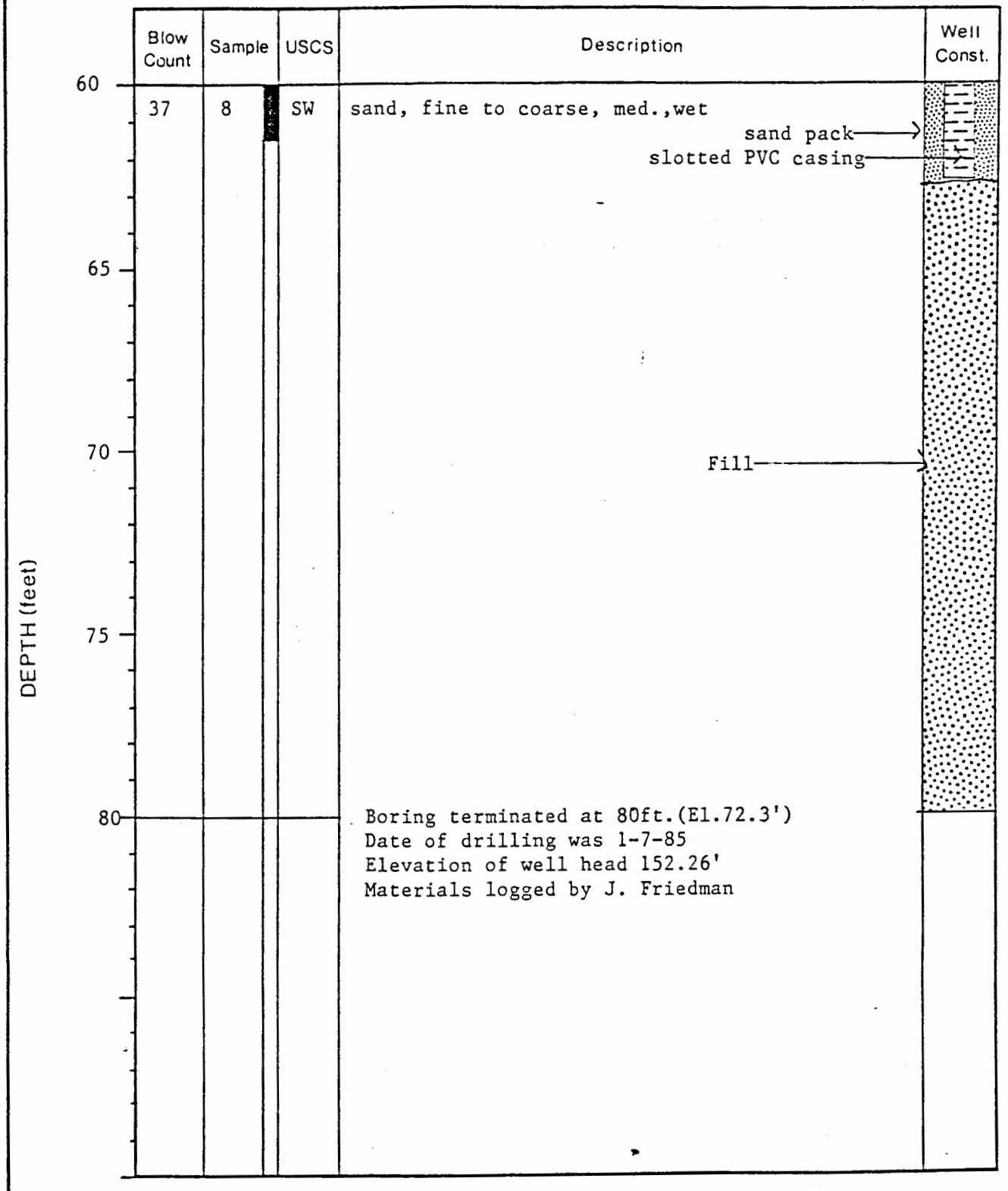
LOG of BORING MW-1

PLATE 5

PREPARED BY: JF DATE: 5/85

CHECKED BY: DATE:

PROJECT NO. Q-1014-1



J.H. KLEINFELDER & ASSOCIATES
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PREPARED BY: JF DATE: 5/85

CHECKED BY: DATE:

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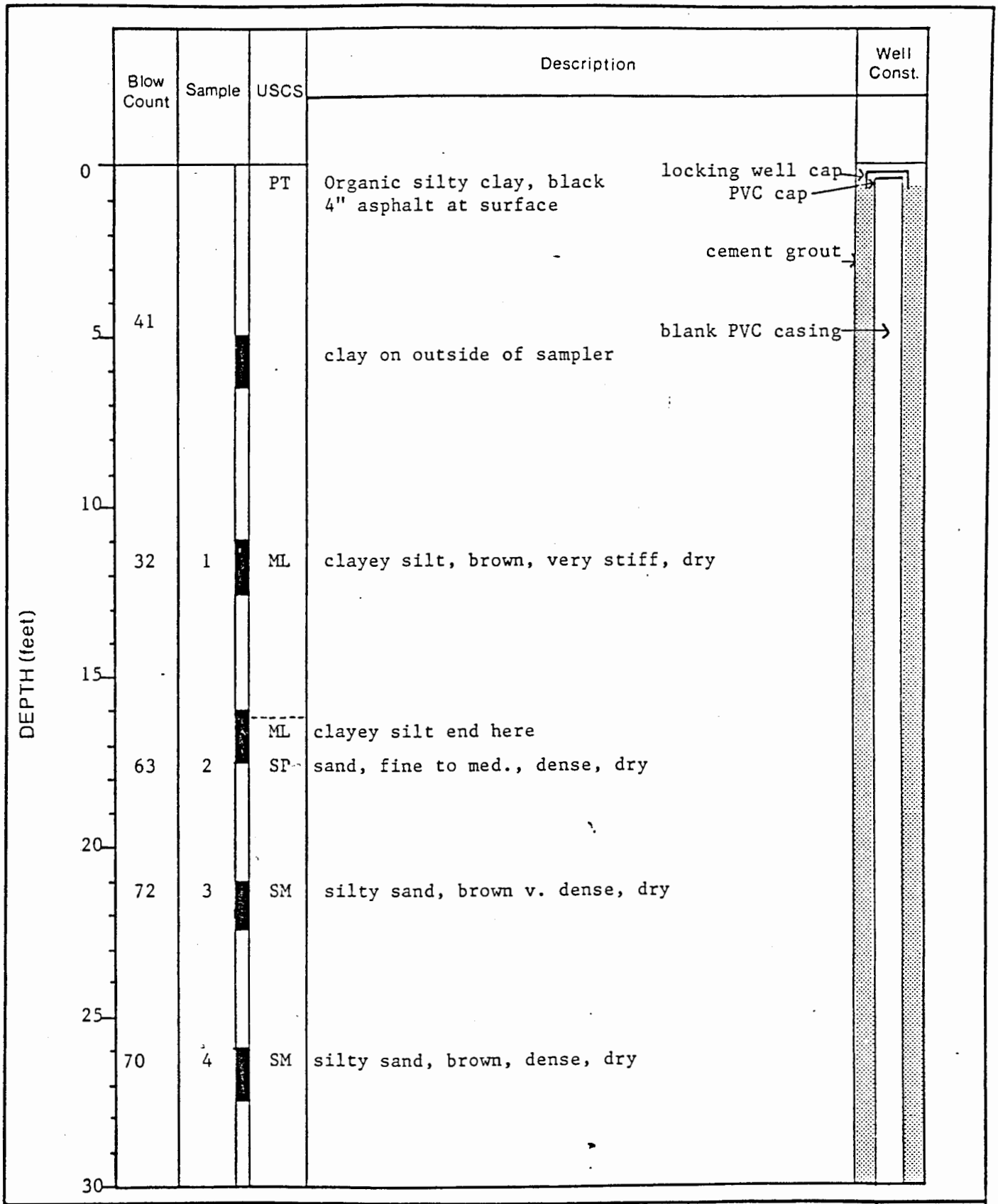
LOG of BORING MW-1

PROJECT NO. Q-1014-1

PLATE 5



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Santa Fe Springs

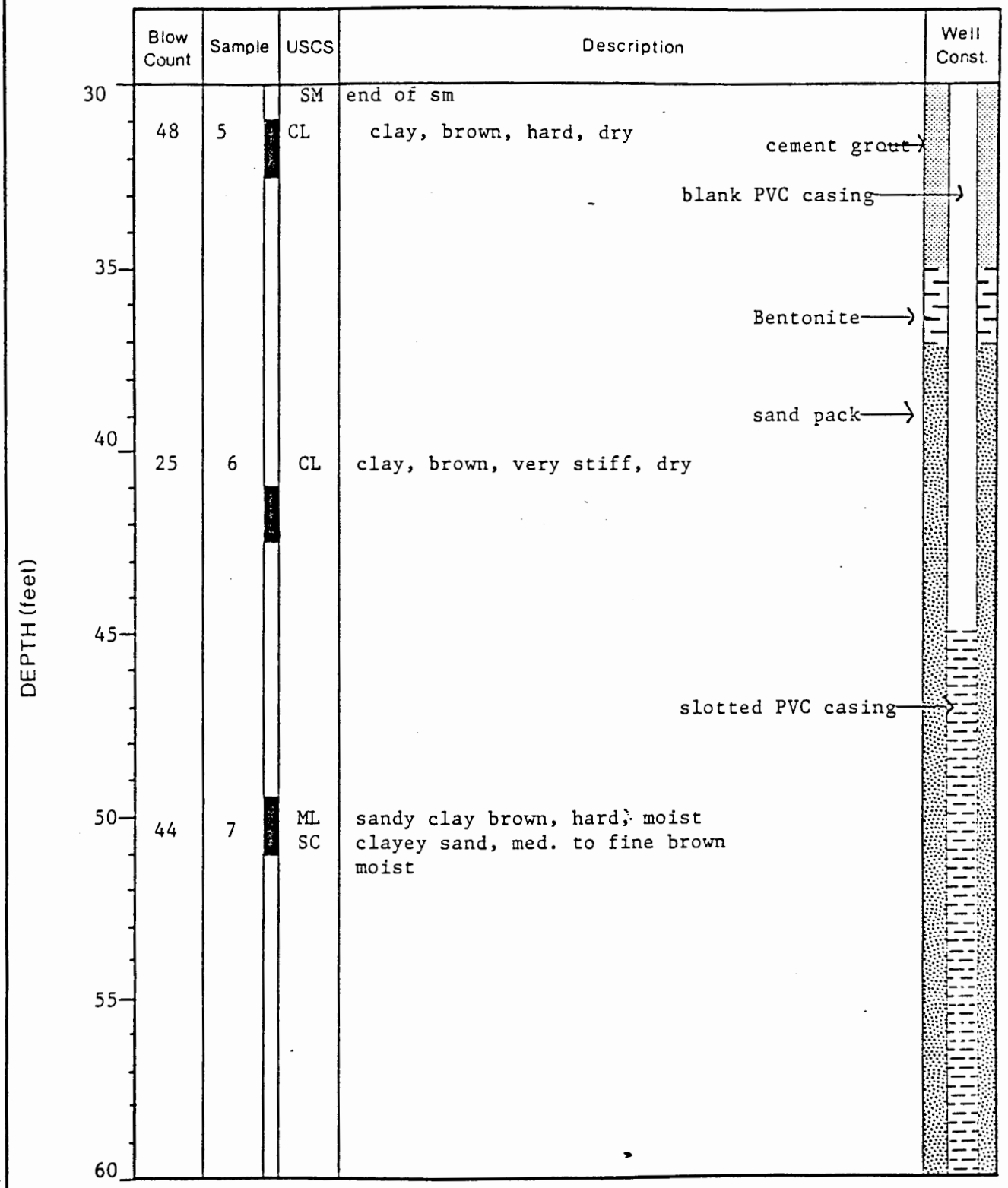
LOG of BORING MW-2

PLATE 6

PREPARED BY: JF DATE: 5/85

CHECKED BY: DATE:

PROJECT NO. Q-1014-1



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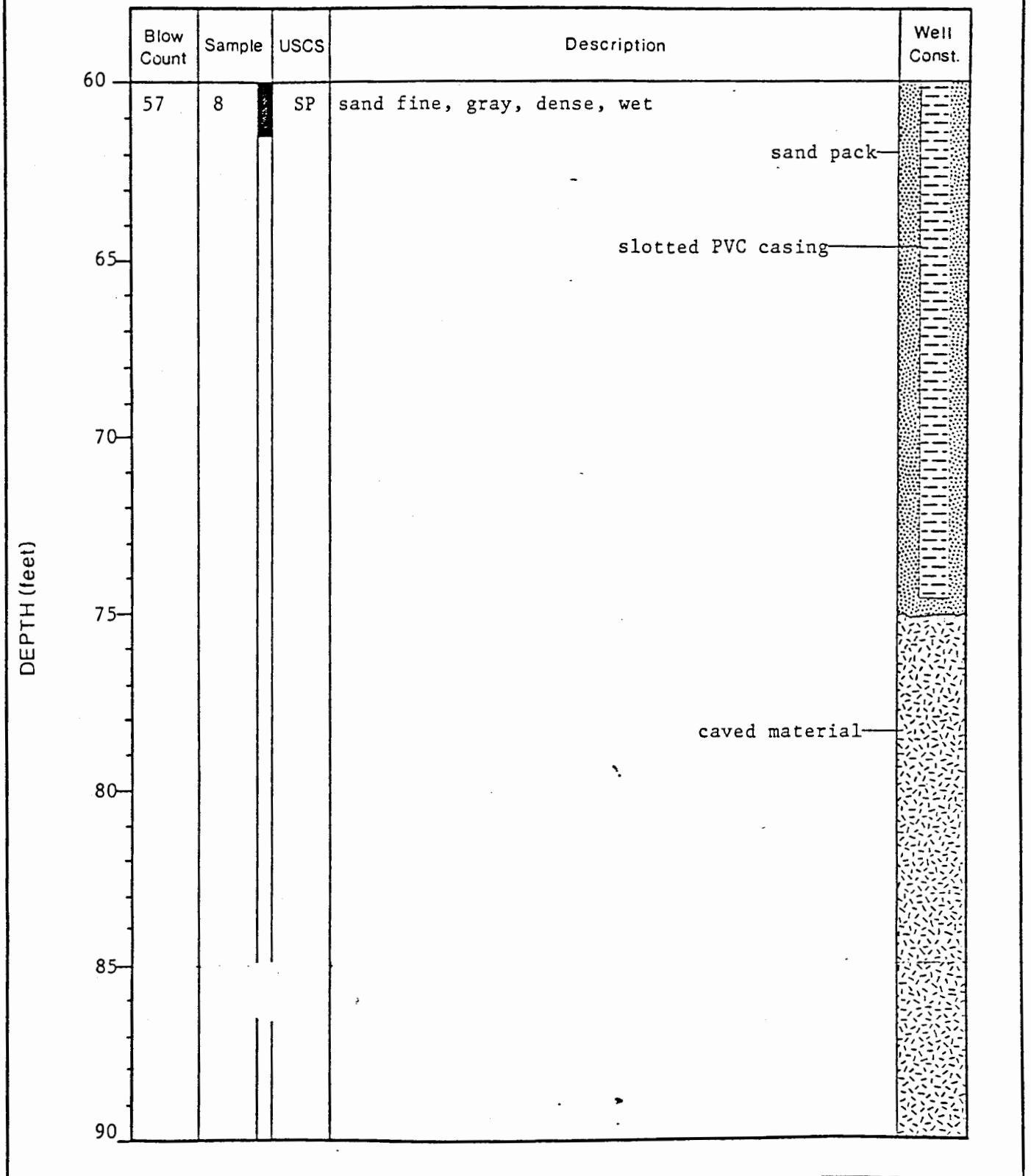
LOG of BORING MW-2

PLATE 6

PREPARED BY: JF DATE: 5/85

CHECKED BY: DATE:

PROJECT NO. 0-1014-1



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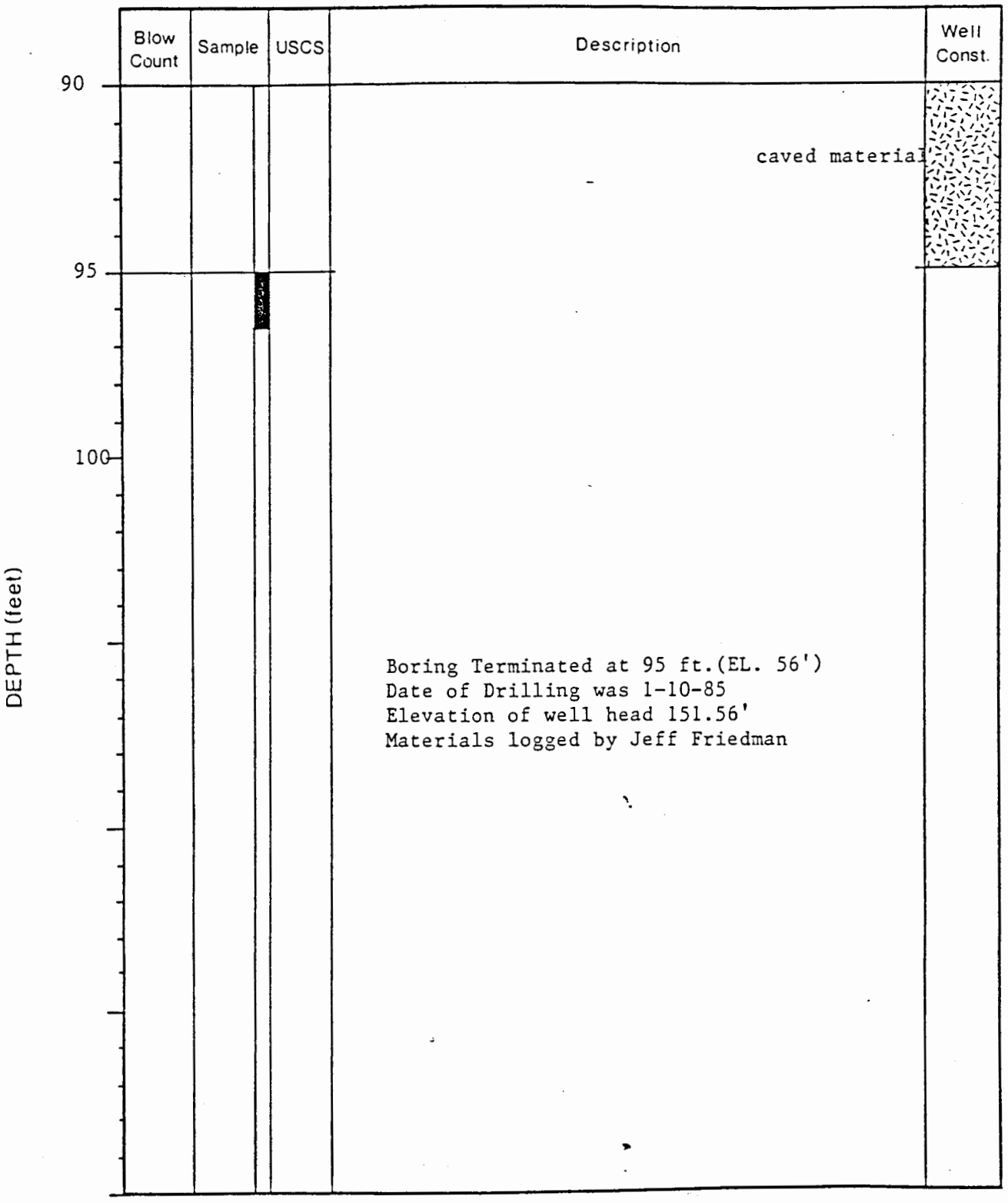
LOG of BORING MW-2

PLATE 6

PREPARED BY: JF DATE: 5/85

CHECKED BY: DATE:

PROJECT NO. Q-1041-1



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GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

PREPARED BY: 5/85 DATE:

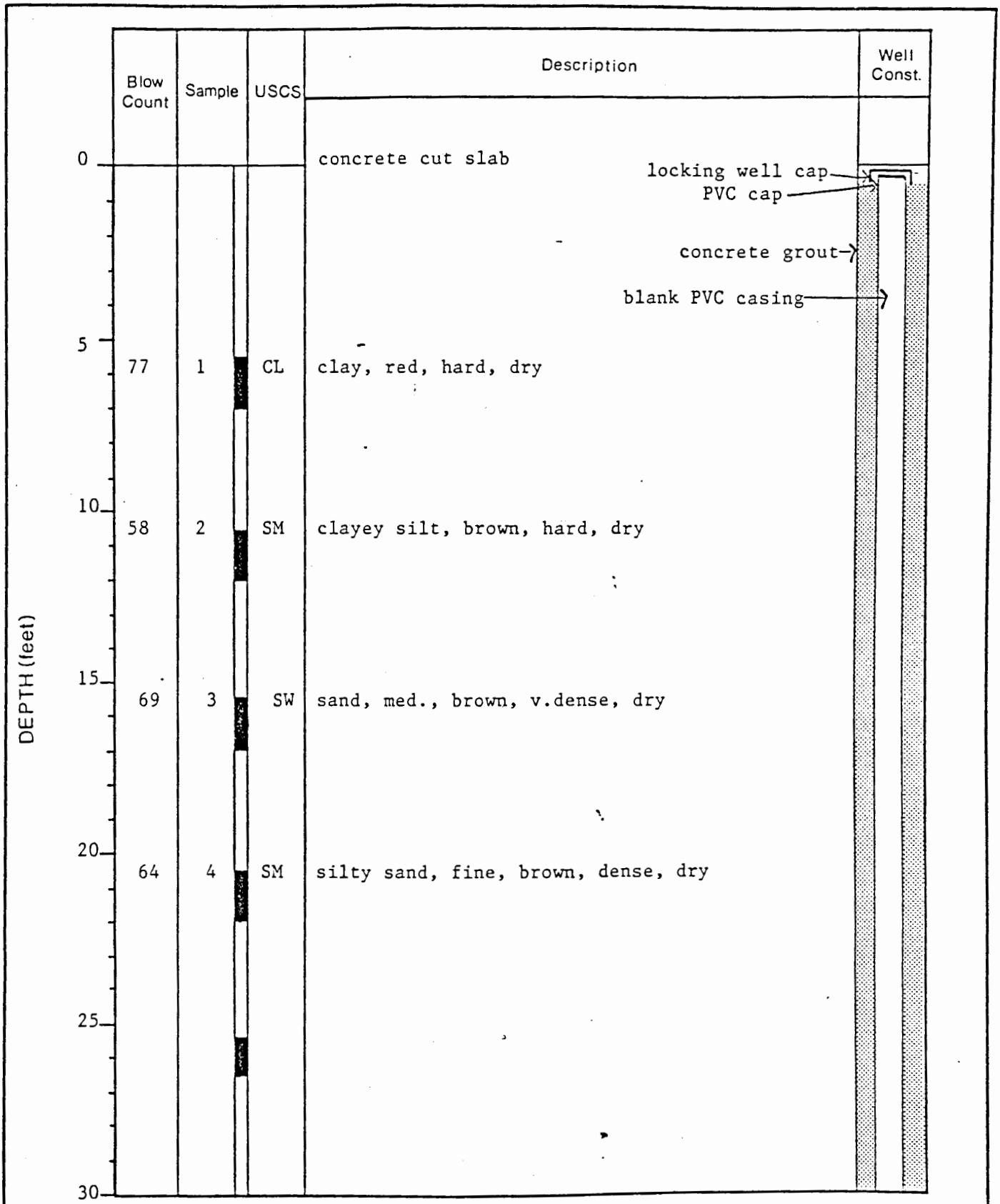
CHECKED BY: DATE:

So. Calif. Chemical
Santa Fe Springs, Ca.

LOG of BORING MW-2

PROJECT NO. Q-1014-1

PLATE 6



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Santa Fe Springs

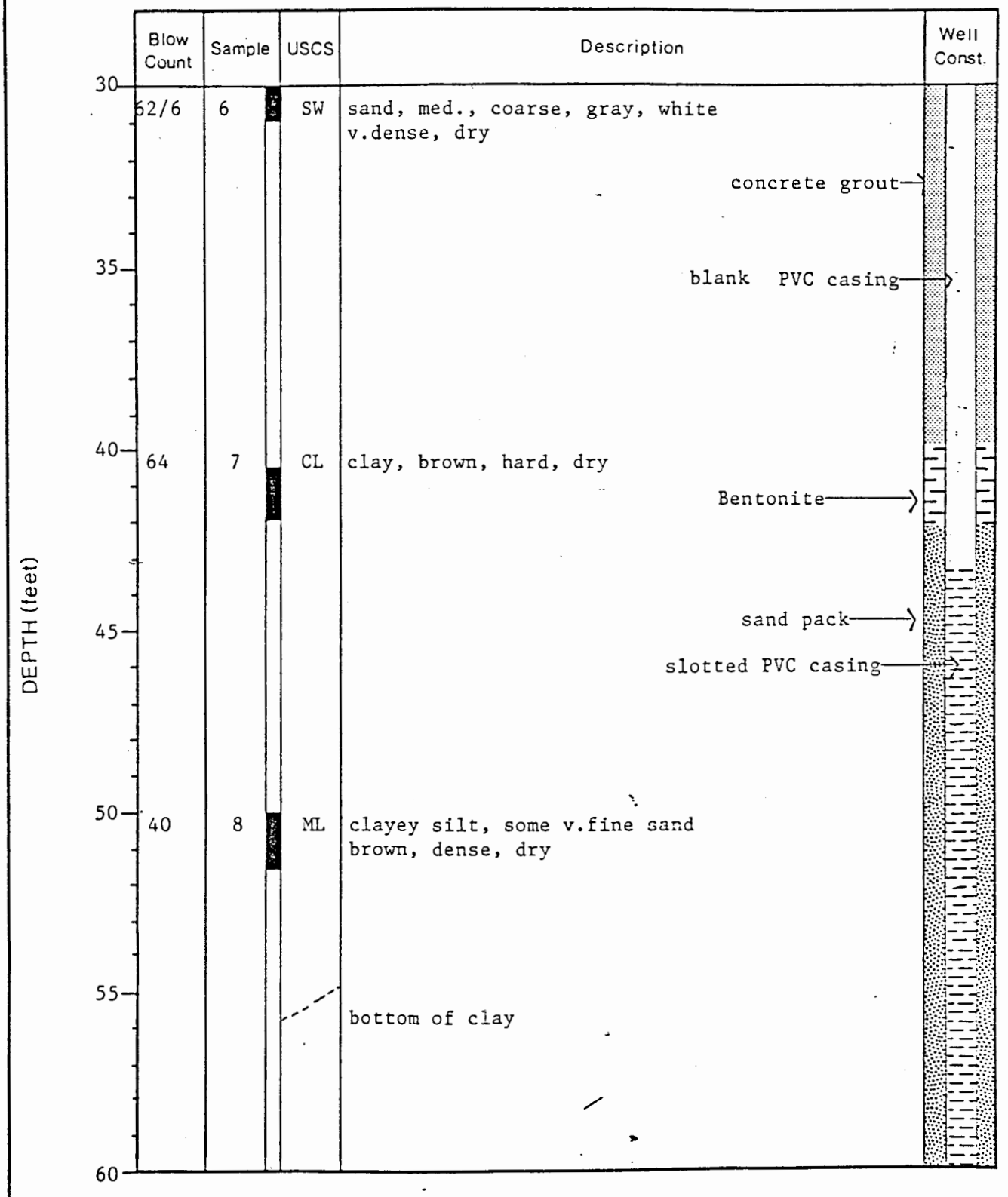
LOG of BORING MW-3

PLATE 7

PREPARED BY: JF DATE: 5/85

CHECKED BY: DATE:

PROJECT NO. Q-1014-1



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Santa Fe Springs

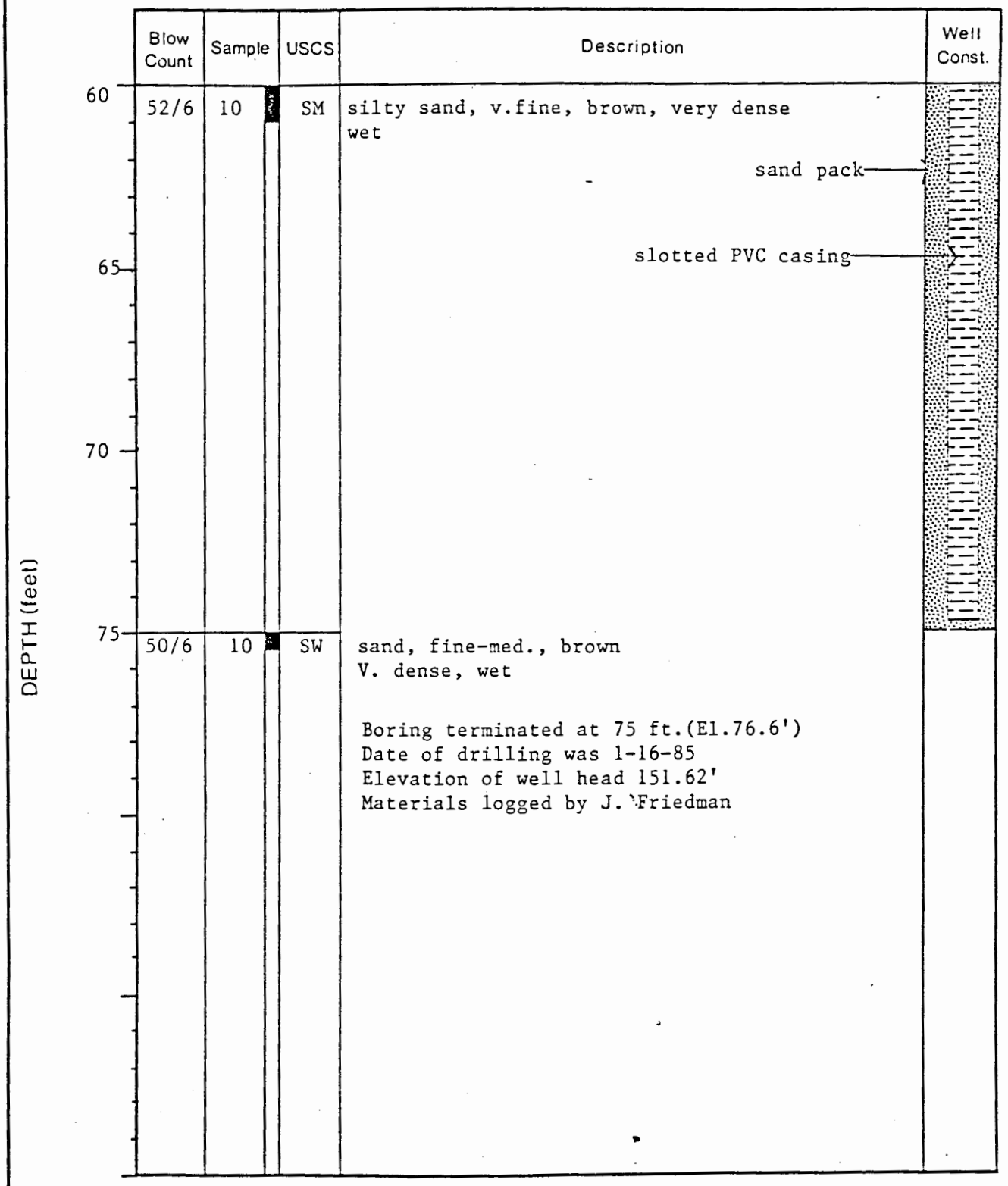
LOG of BORING MW-3

PLATE 7

PREPARED BY: JF DATE: 5/85

CHECKED BY: DATE:

PROJECT NO. 0-1014-1



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PREPARED BY: JF DATE: 5/85

CHECKED BY: DATE:

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Santa Fe Springs

LOG of BORING MW-3

PROJECT NO. Q-1014-1

PLATE 7

Blow Count	Sample	USCS	Description
		SC	clayey sand, black 1ft.
38	1	CL	clay, red, v.stiff, dry
27	2	ML	silty clay, red, v.stiff, dry
40	3	SM	silty sand, white, dense, dry
64	4	SM	silty sand, fine, white, v. dense, dry
65/6	5	SM	silty sand, med.,fine, brown, v.dense dry

DEPTH (feet)

0
5
10
15
20
25
30

Well Const.

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PREPARED BY: JF DATE: 5/85

CHECKED BY: DATE:

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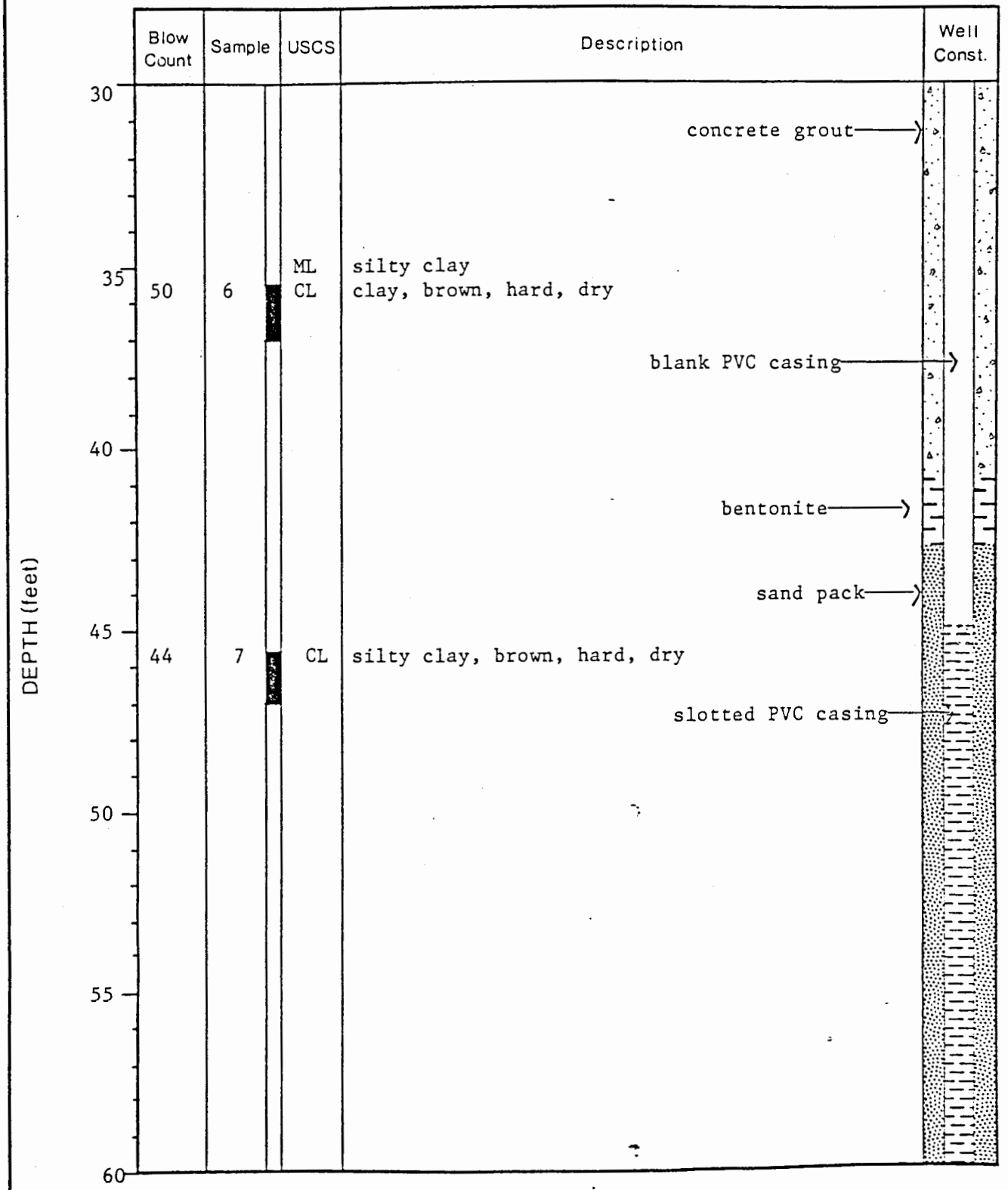
Santa Fe Springs, Ca.

LOG of BORING MW-4

PROJECT NO. Q-1014-1

PLATE 8



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Santa Fe Springs, Ca.

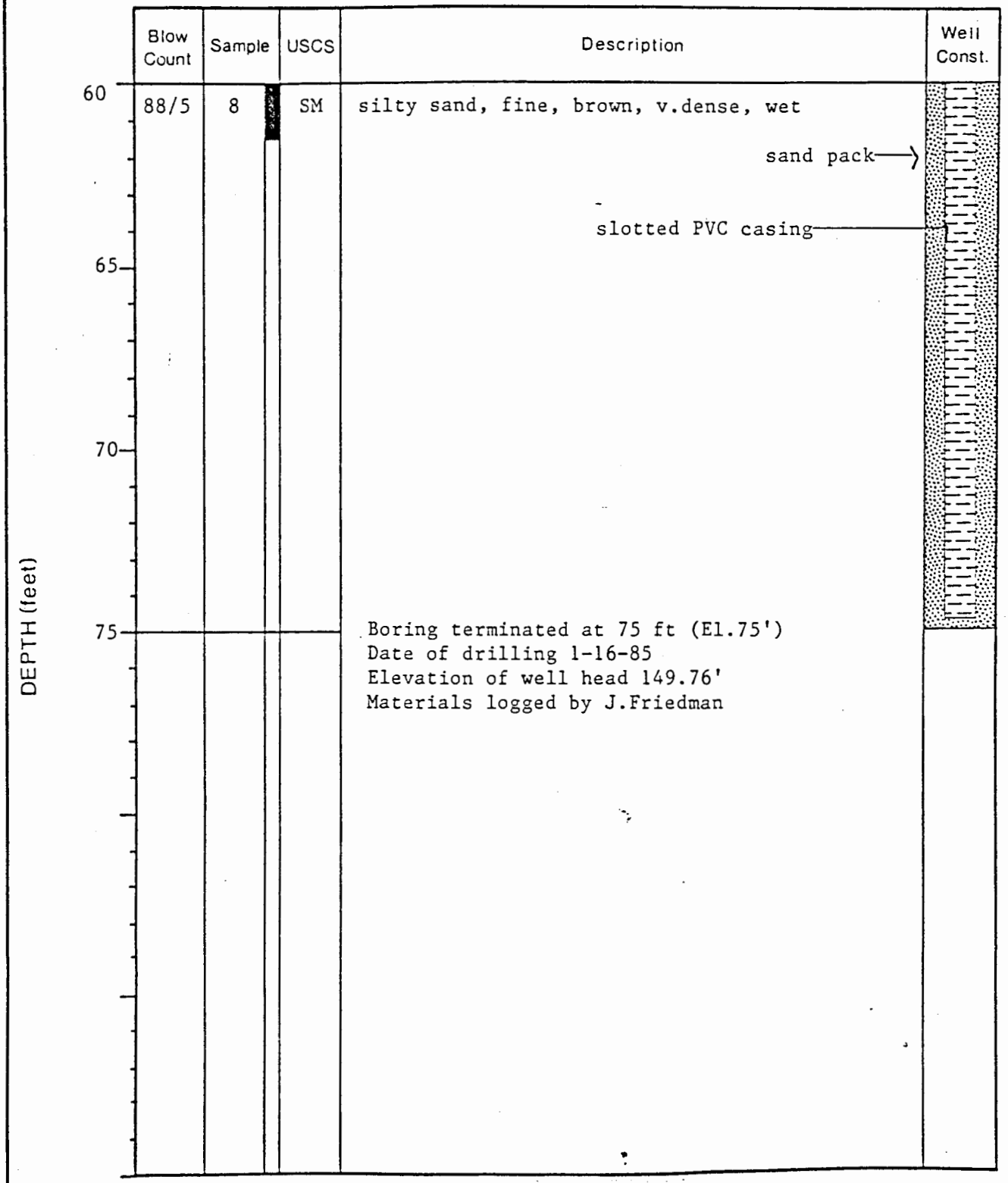
LOG of BORING MW-4

PLATE 8

PREPARED BY: JF DATE: 5/85

CHECKED BY: DATE:

PROJECT NO. 0-1014-1



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So, Calif. Chemical
Santa Fe Springs, Ca.

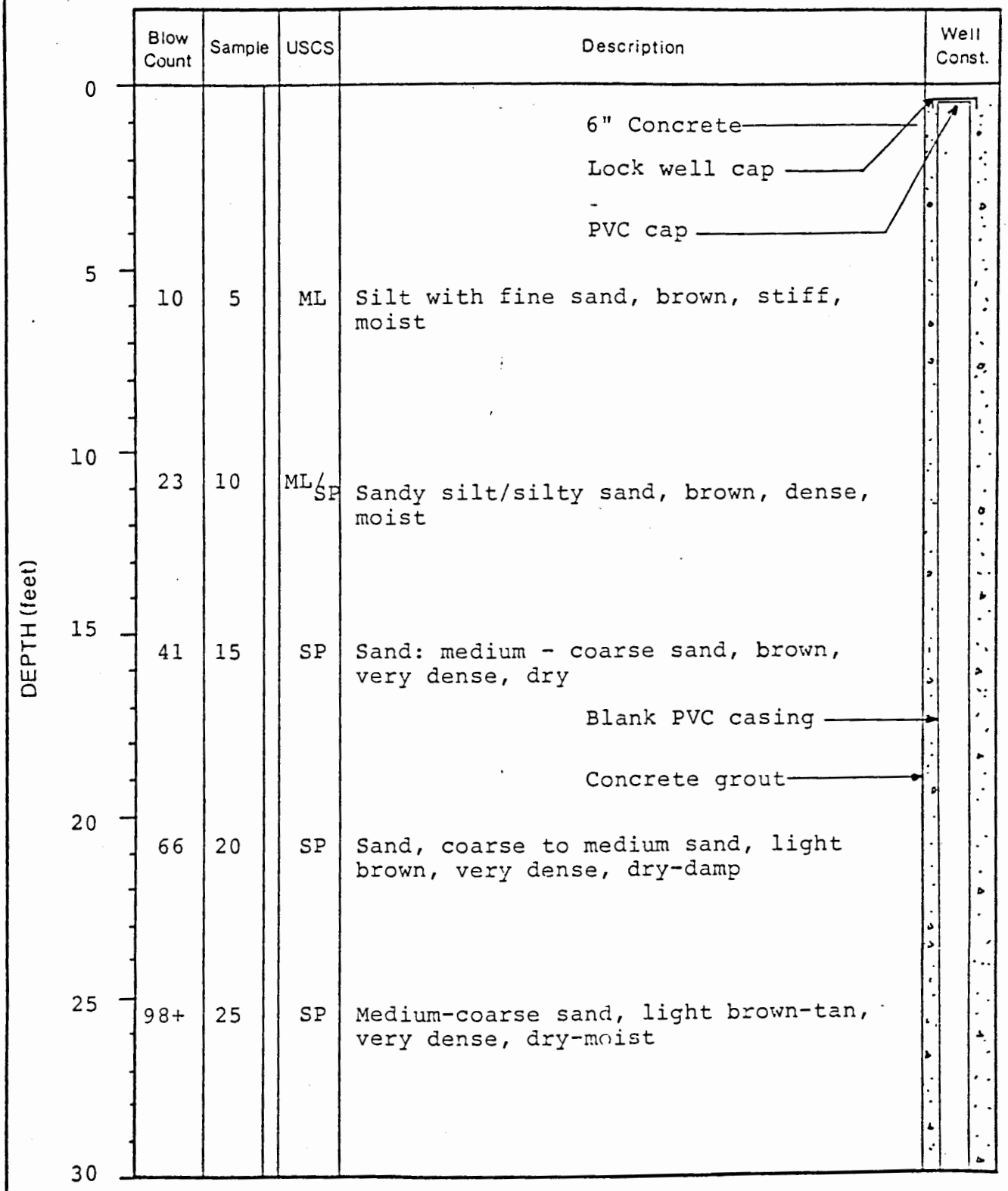
LOG of BORING MW-4

PLATE 8

PREPARED BY: JF DATE: 5/85

CHECKED BY: DATE:

PROJECT NO. Q-1014-1



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Southern California Chemical

LOG of BORING MW-4A

PLATE 9

PREPARED BY: DATE:

CHECKED BY: DATE:

PROJECT NO. Q-1014-2

Blow Count	Sample	USCS	Description	Well Const.
80	35	ML/CL	Clayey silt/silty clay, dark brown, very stiff-hard, very moist	
80	45			

DEPTH (feet)

35
40
45
50
55
60
65

Blank PVC casing

Concrete grout

J.H. KLEINFELDER & ASSOCIATES
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Southern California Chamical

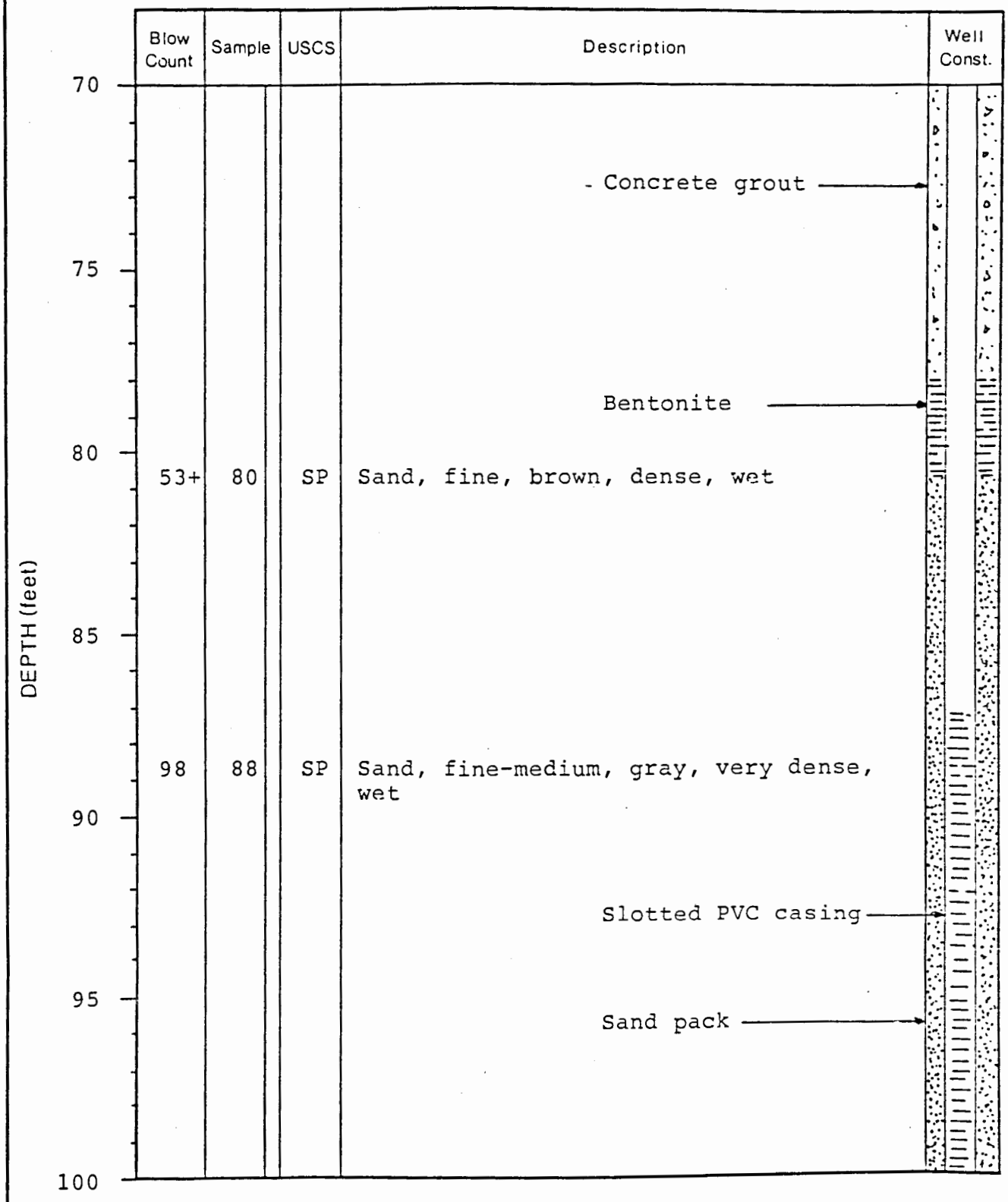
LOG of BORING MW-4A

PLATE 9

PREPARED BY: · DATE:

CHECKED BY: DATE:

PROJECT NO. Q-1014-2



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Southern California Chemical

LOG of BORING MW-4A

PLATE 9

PREPARED BY: DATE:

CHECKED BY: DATE:

PROJECT NO. Q-1014-2

DEPTH (feet)	Blow Count	Sample	USCS	Description	Well Const.
100	82	100	ML	Silt & very fine sand, brown, very dense, wet	
				Slotted PVC casing	
105		105	ML	Silt, occasional clast 72cm, brown, dense, damp	
				Sand pack	
110	75	110		Silty sand, brown, very dense, wet	
	75		SM/SP	Sand, fine-medium, very dense, wet	
				Boring terminated at 110'. Date of drilling 7-10-85. Materials logged by Ken Durand.	

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Southern California Chemical

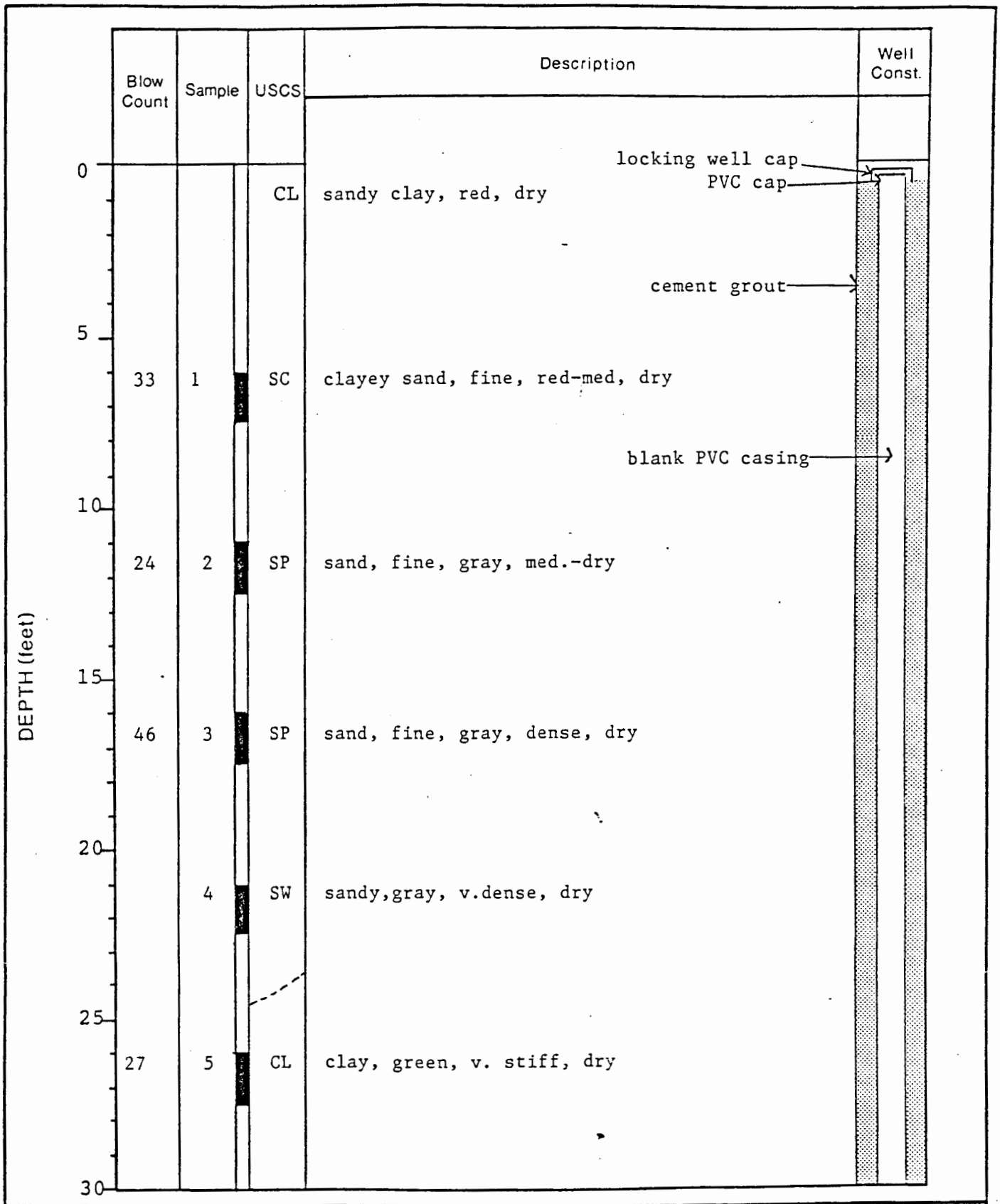
LOG of BORING MW-4A

PLATE 9.

PREPARED BY: DATE:

CHECKED BY: DATE:

PROJECT NO. Q-1014-2



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Santa Fe Springs

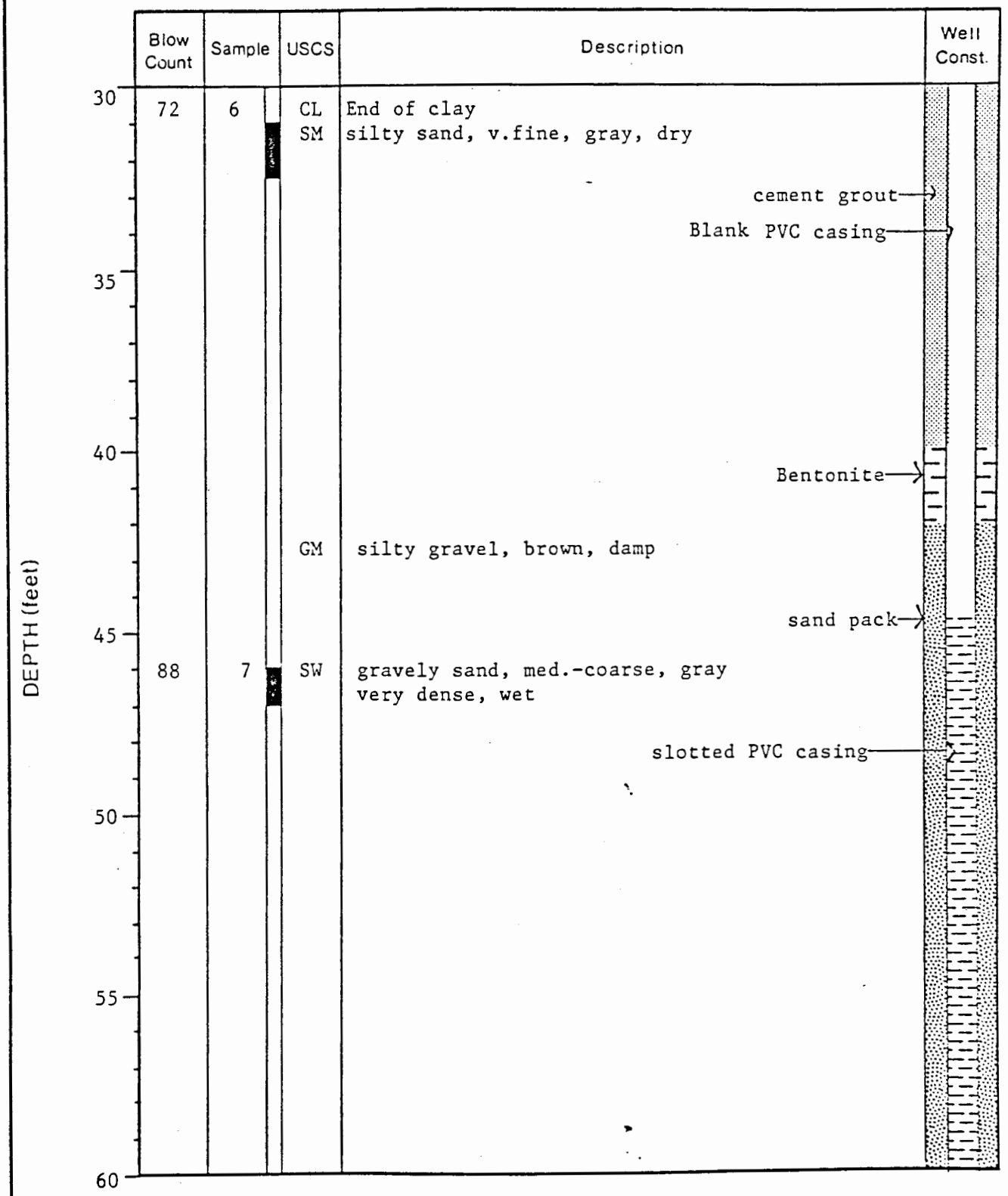
LOG of BORING MW-5

PLATE 10

PREPARED BY: JF DATE: 5/85

CHECKED BY: DATE:

PROJECT NO. 1014-1



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Santa Fe Springs

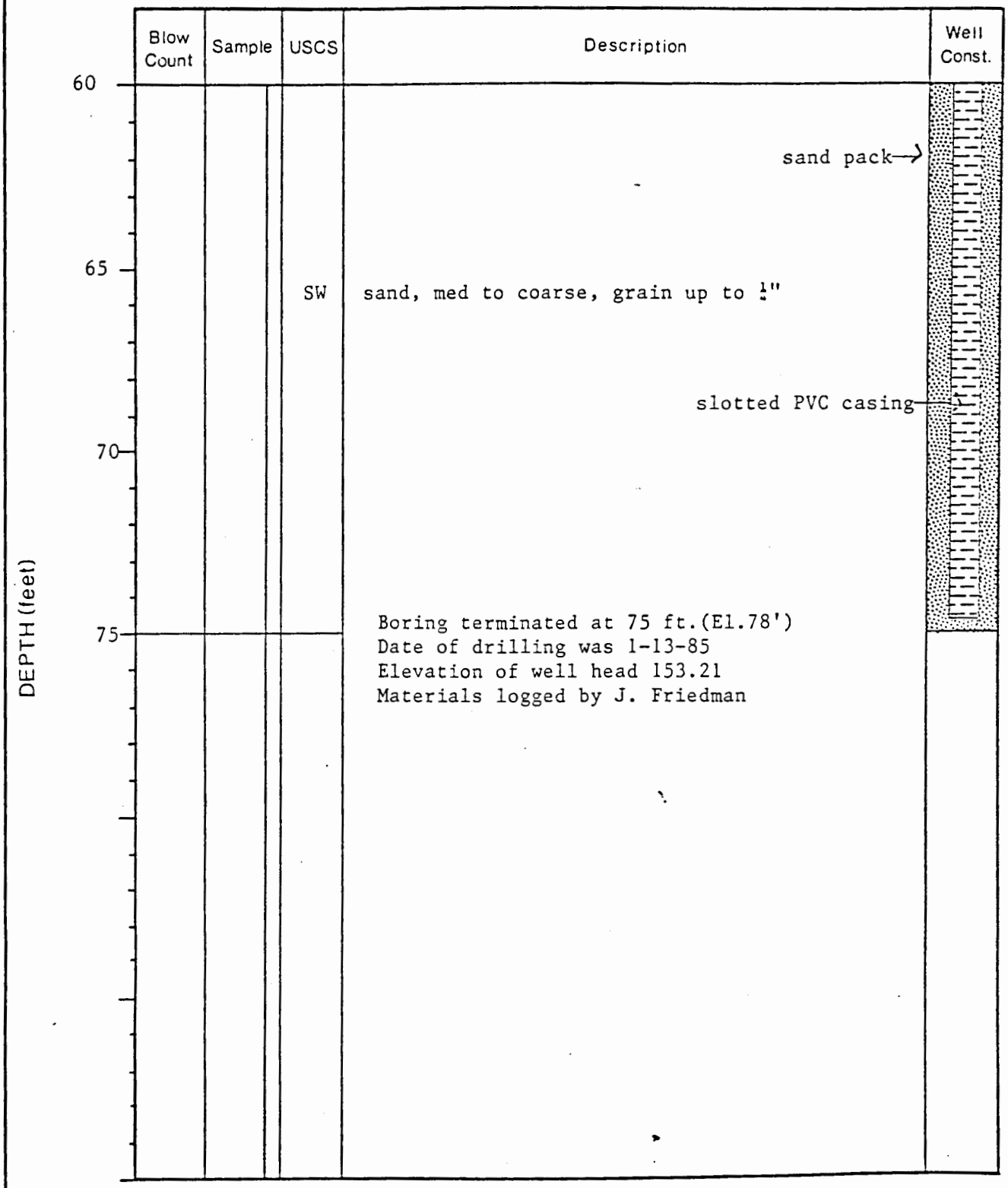
LOG of BORING MW-5

PLATE 10

PREPARED BY: JF DATE: 5/85

CHECKED BY: DATE:

PROJECT NO. 0-1014-1



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PREPARED BY: JF DATE: 5/85

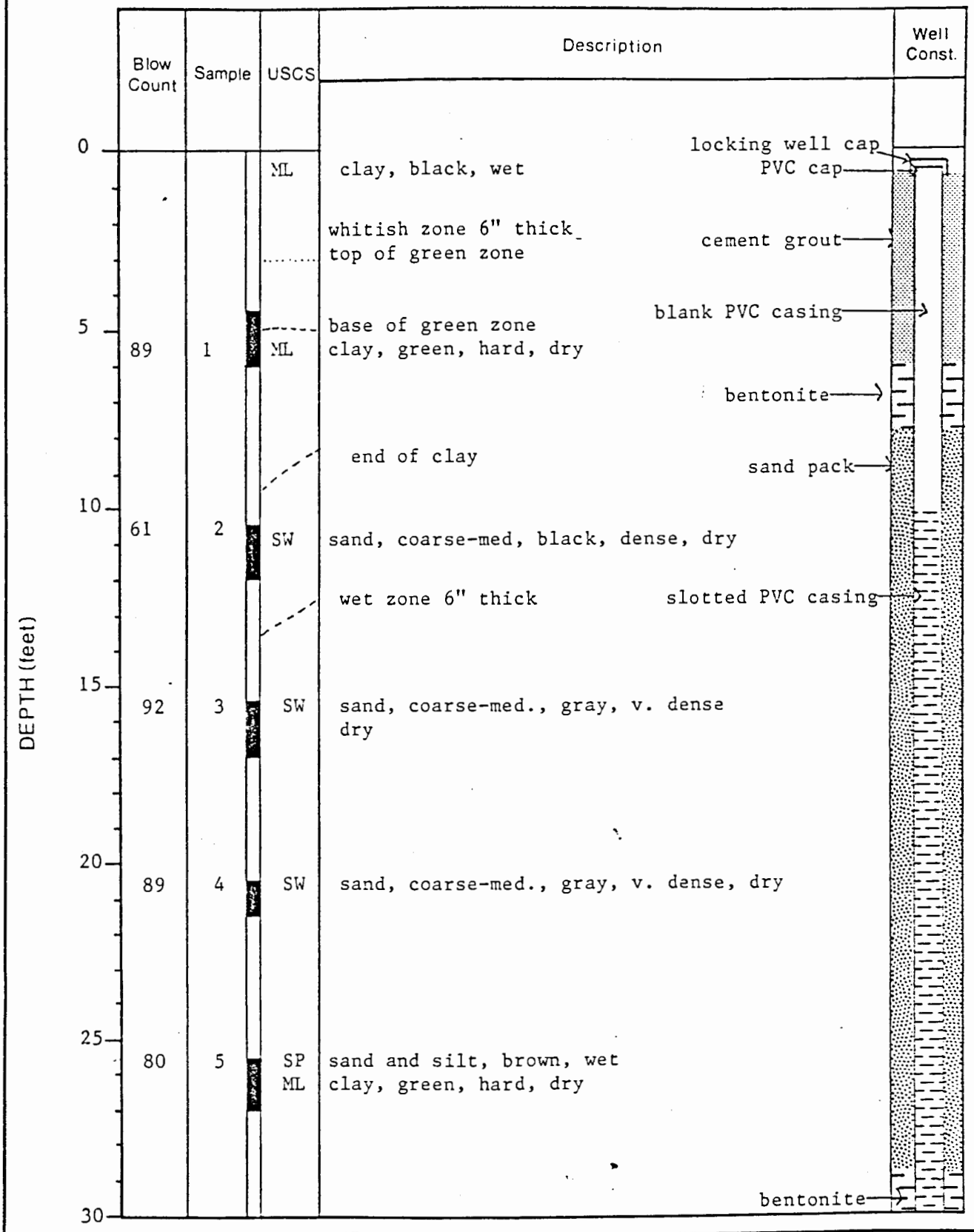
CHECKED BY: DATE:

So. Calif. Chemical
Santa Fe Springs

LOG of BORING MW-5

PROJECT NO. Q-1014-1

PLATE
10



J.H. KLEINFELDER & ASSOCIATES
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Santa Fe Springs, Ca.

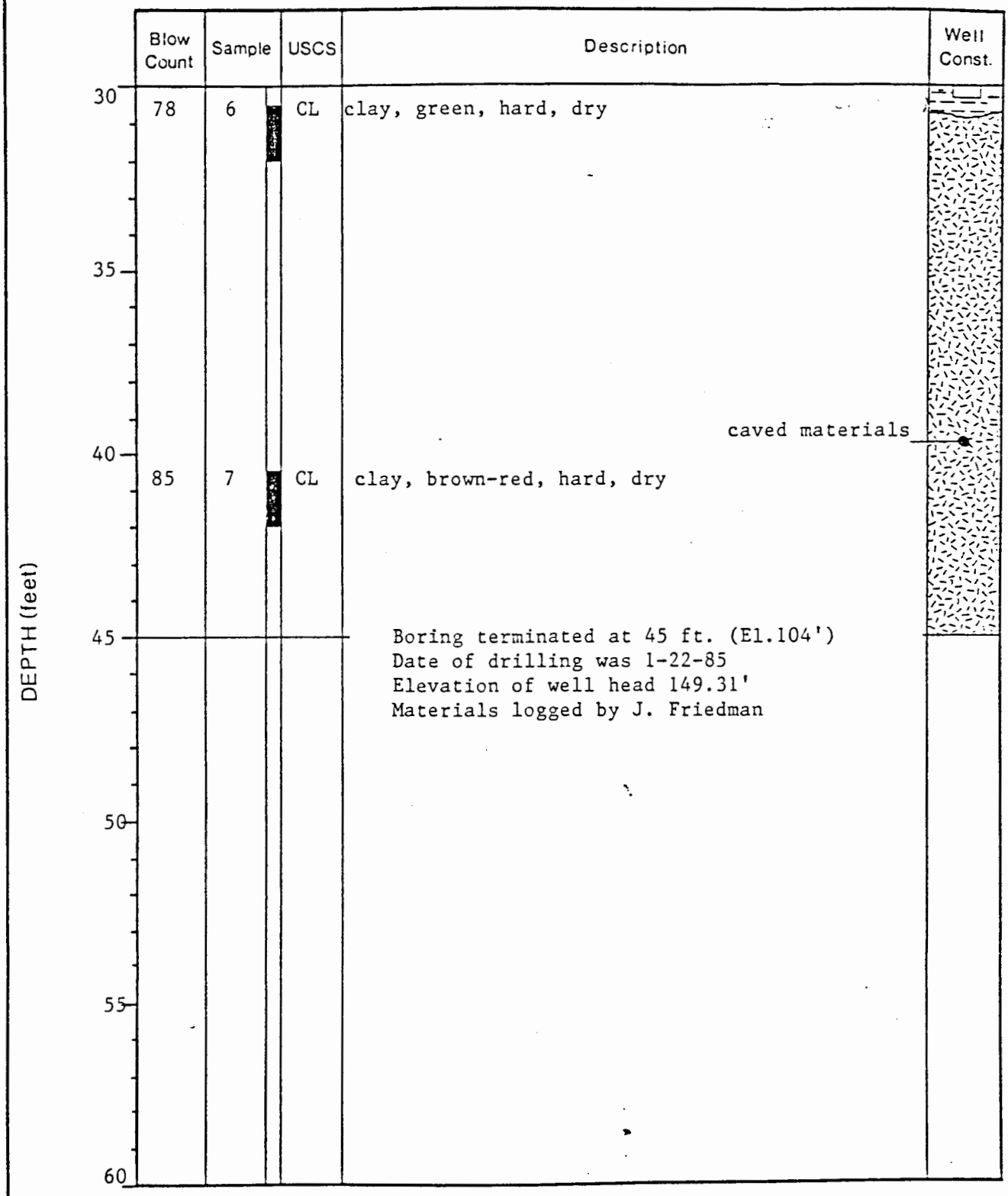
LOG of BORING MW-6A

PLATE 11

PREPARED BY: JF DATE: 5/85

CHECKED BY: DATE:

PROJECT NO. Q-1014-1



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PREPARED BY: JF DATE: 5/85

CHECKED BY: DATE:

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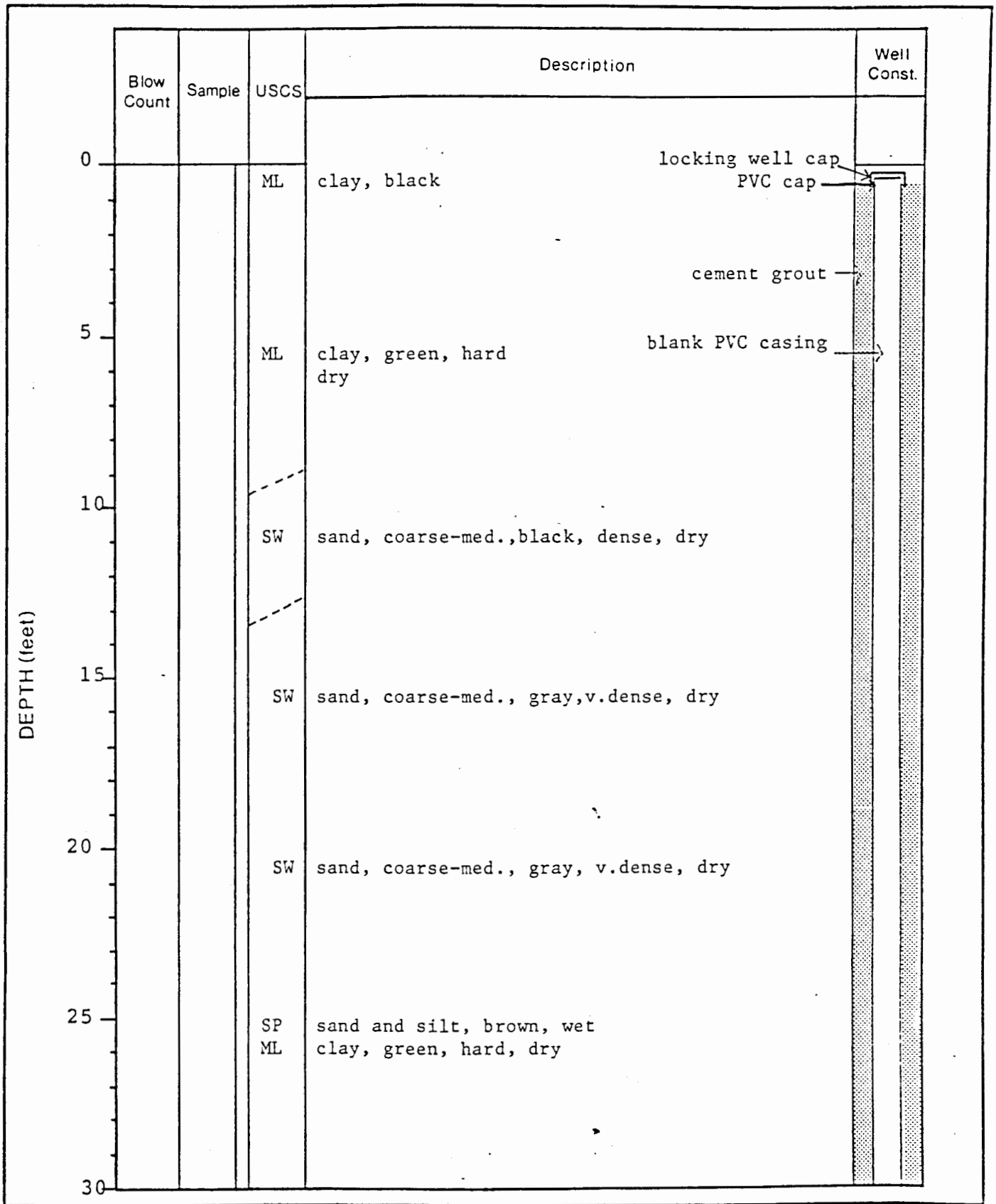
Santa Fe Springs, Ca.

LOG of BORING MW-6A

PROJECT NO. Q-1014-1

PLATE 11



J.H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

PREPARED BY: JF DATE: May 85

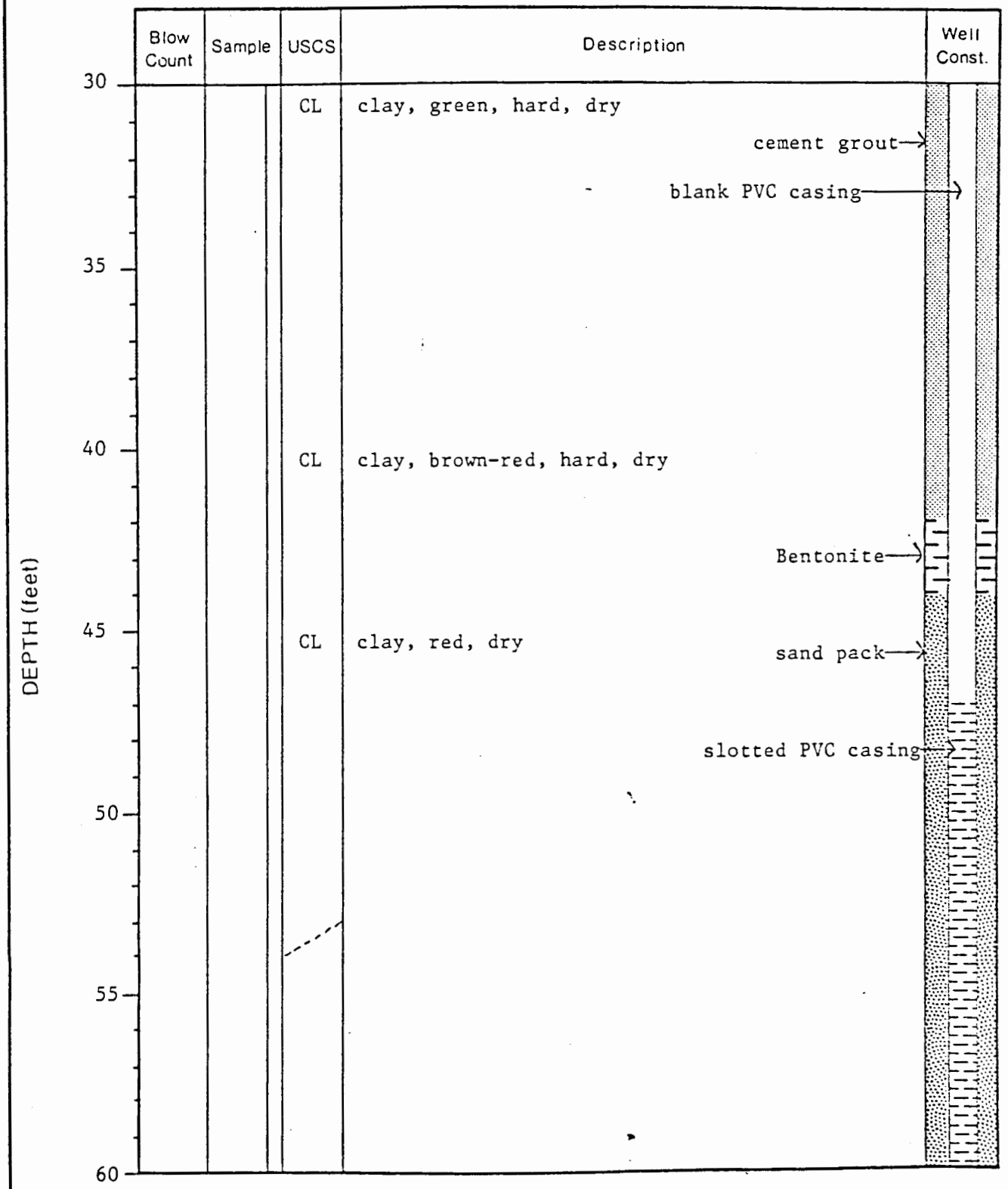
CHECKED BY: DATE:

So. CAlif. Chemical
Santa Fe Springs

LOG of BORING MW-6B

PROJECT NO. Q-1014-1

PLATE
12



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So. Calif. Chemical
Santa Fe Springs

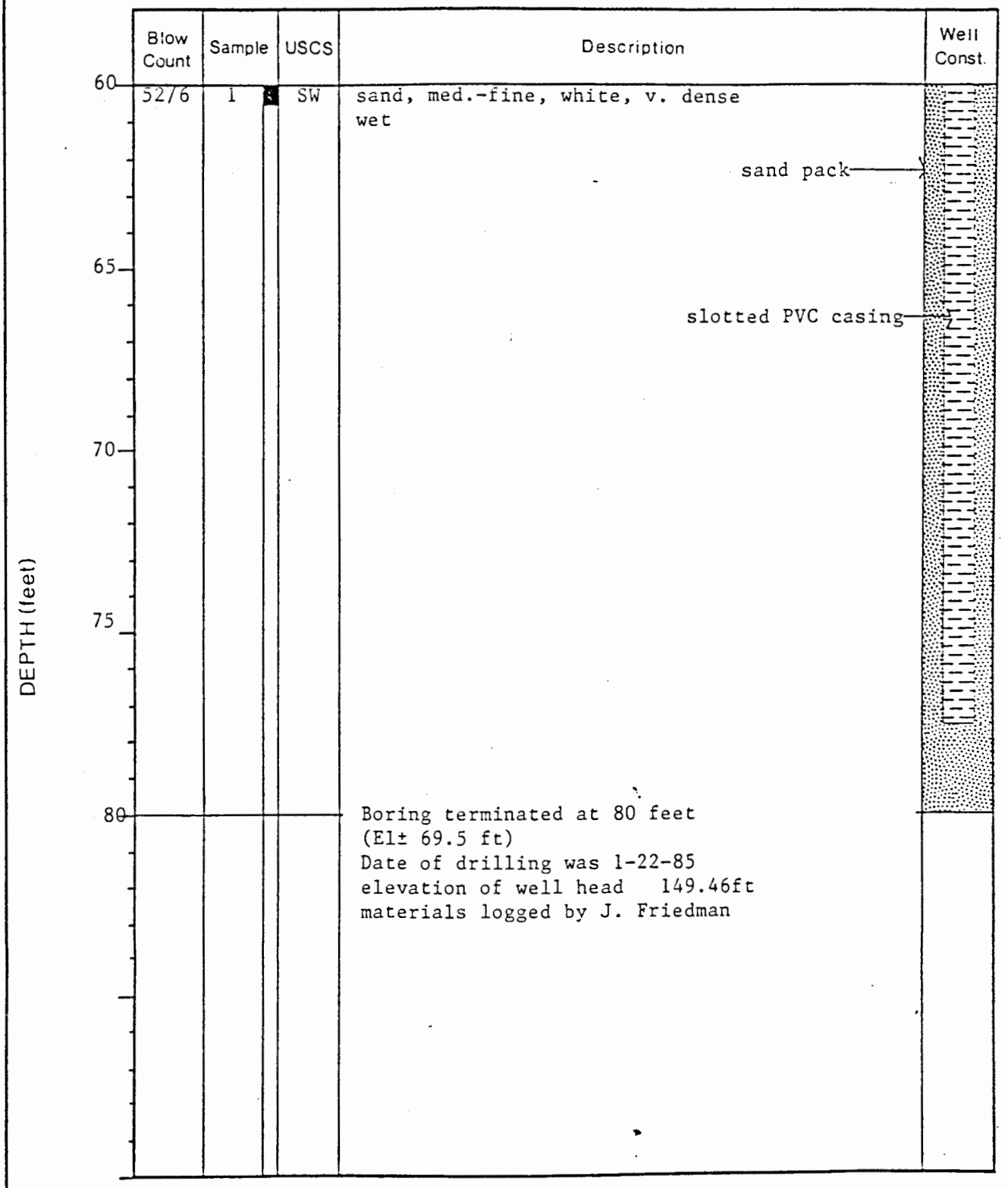
LOG of BORING MW-6B

PLATE 12

PREPARED BY: JF DATE: 5/85

CHECKED BY: DATE:

PROJECT NO. 0-1014-1



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Santa Fe Springs

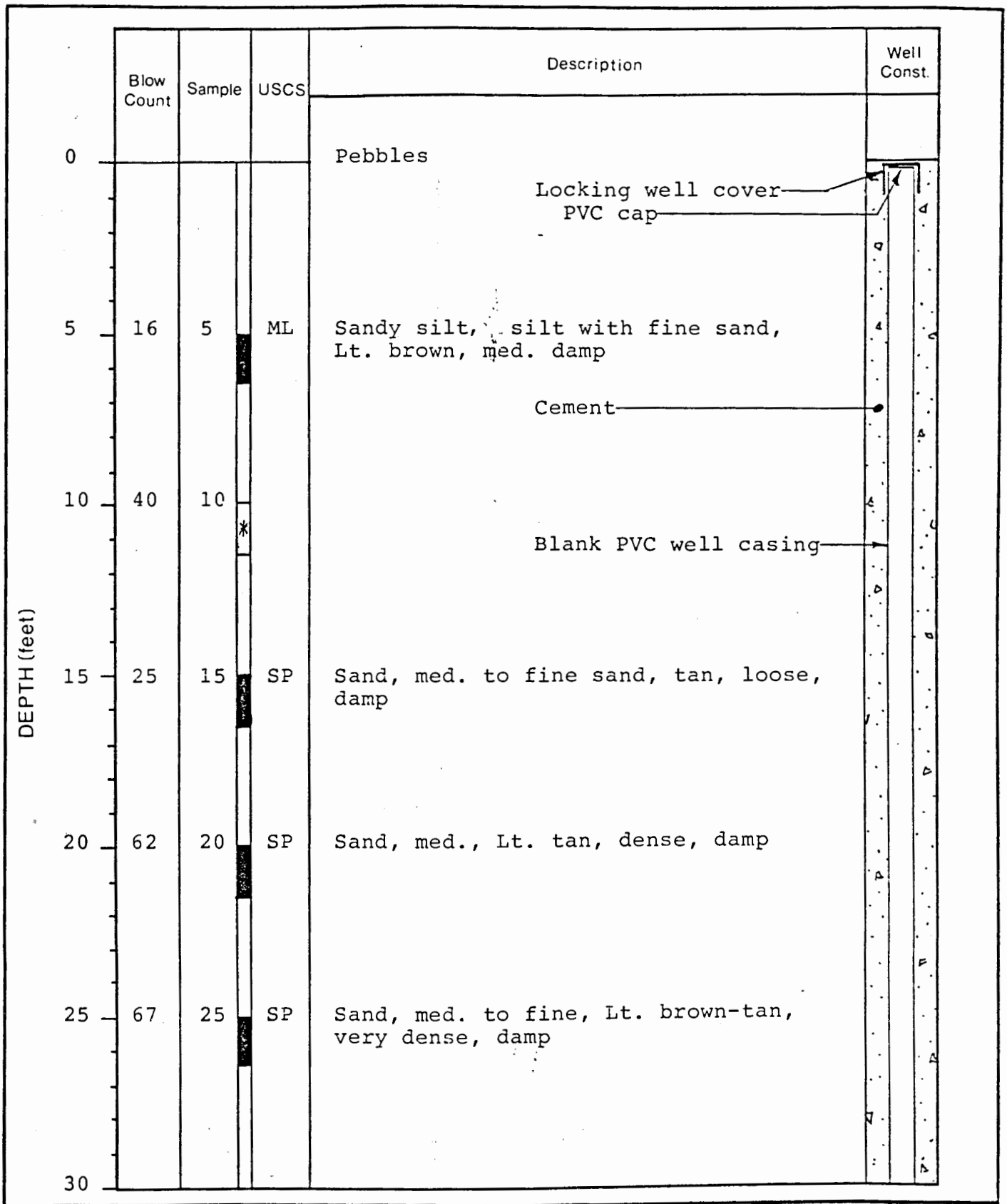
LOG of BORING MW-6B

PLATE 12

PREPARED BY: JF DATE: 5/85

CHECKED BY: DATE:

PROJECT NO. 1014-1



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PREPARED BY: DATE:

CHECKED BY: DATE:

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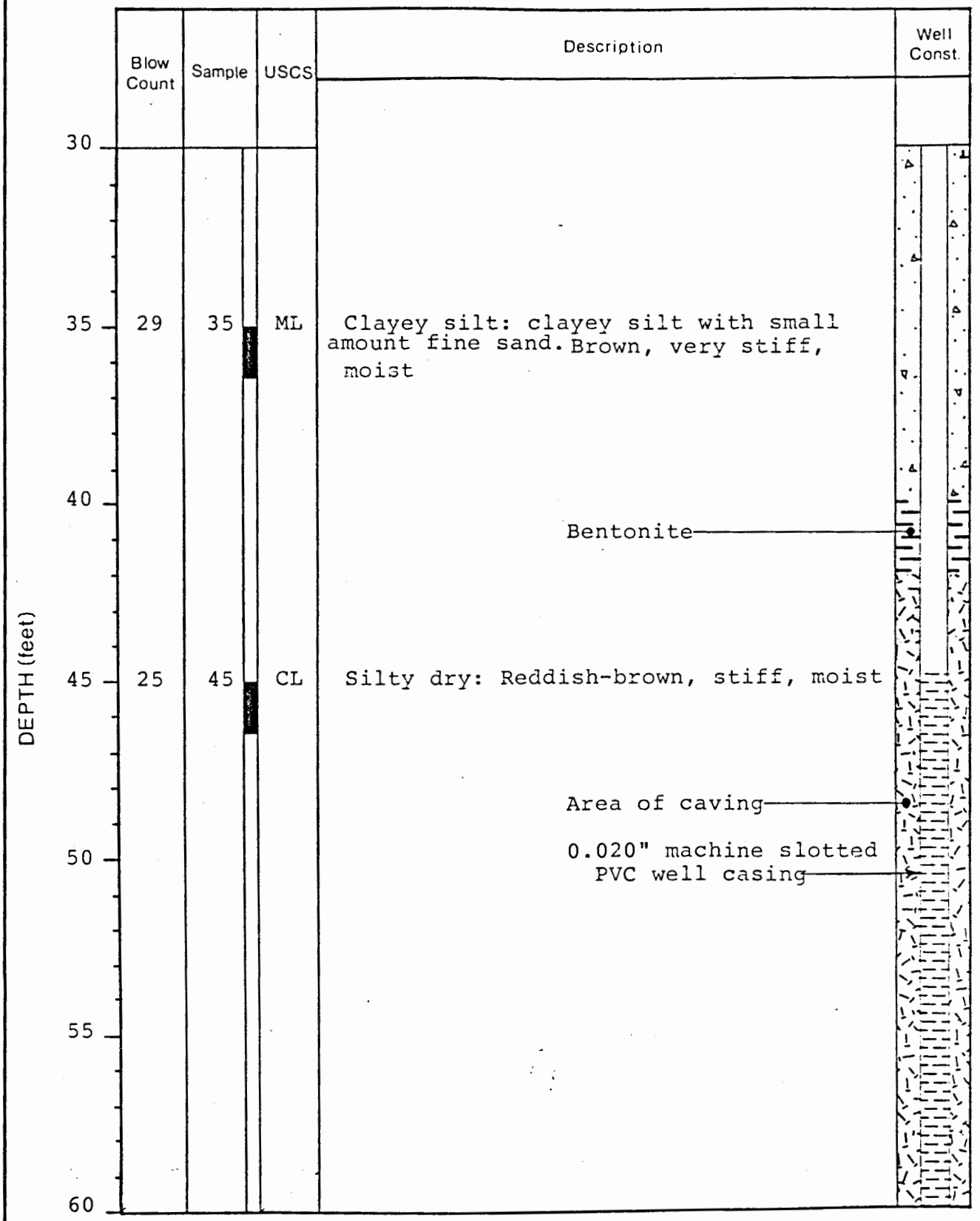
SANTA FE SPRINGS, CALIFORNIA

LOG of BORING MW-7

PROJECT NO. Q1014-2

PLATE 13



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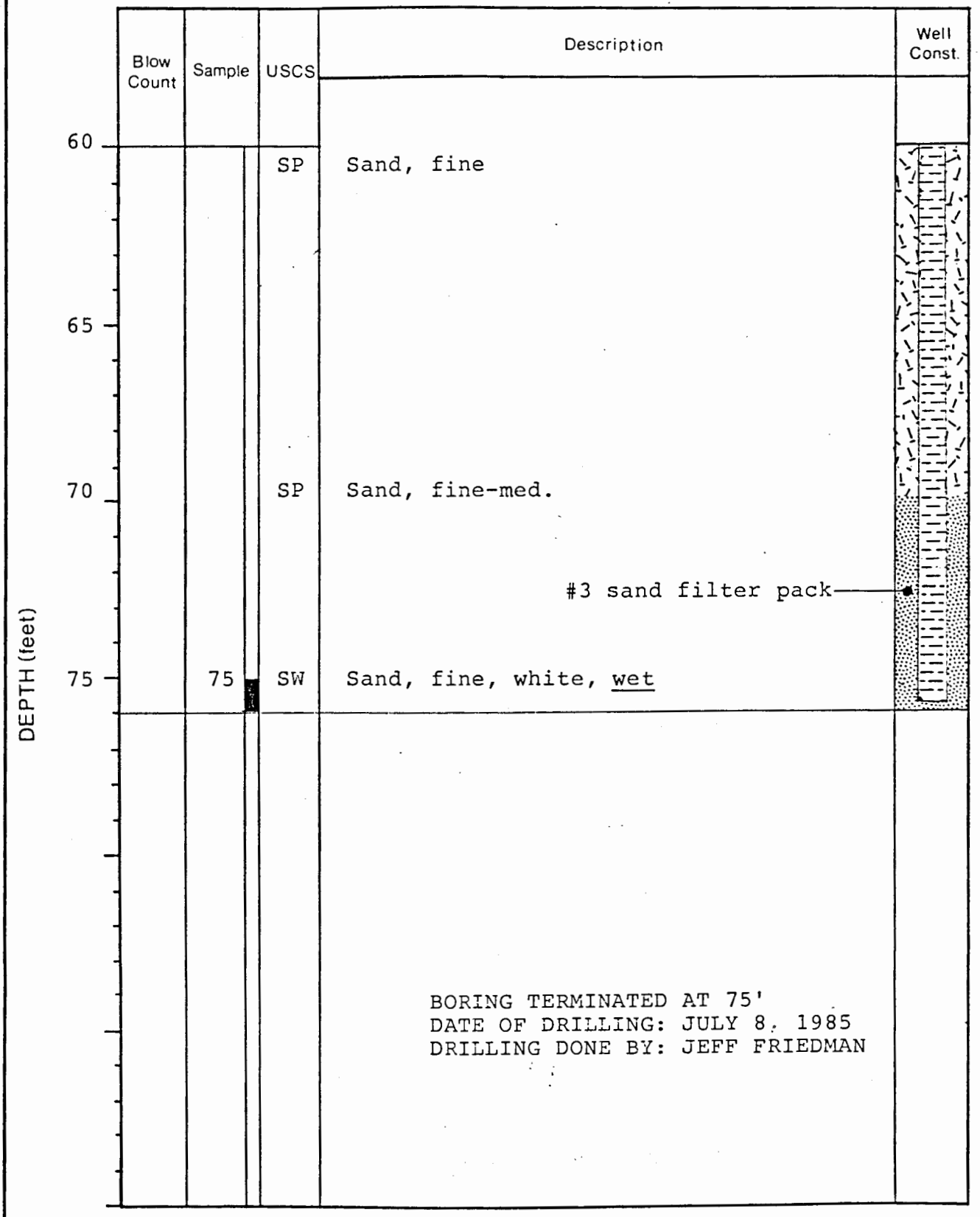
SANTA FE SPRINGS, CALIFORNIA
LOG of BORING MW-7

PLATE
13

PREPARED BY: DATE:
CHECKED BY: DATE:
PROJECT NO. Q1014-2



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SANTA FE SPRINGS, CALIFORNIA

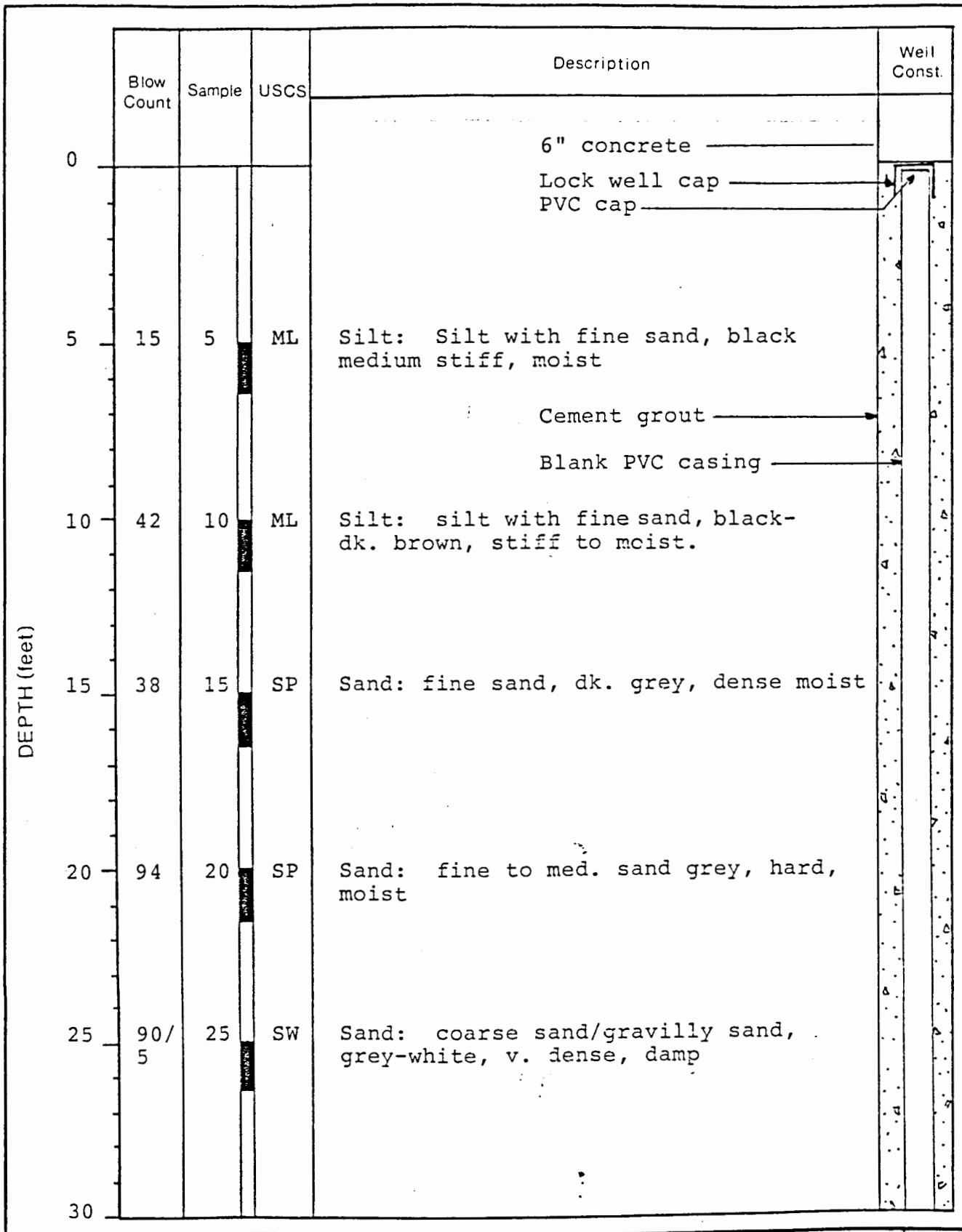
LOG of BORING MW-7

PLATE 13

PREPARED BY: DATE:

CHECKED BY: DATE:

PROJECT NO. Q1014-2



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SANTA FE SPRINGS, CALIF.

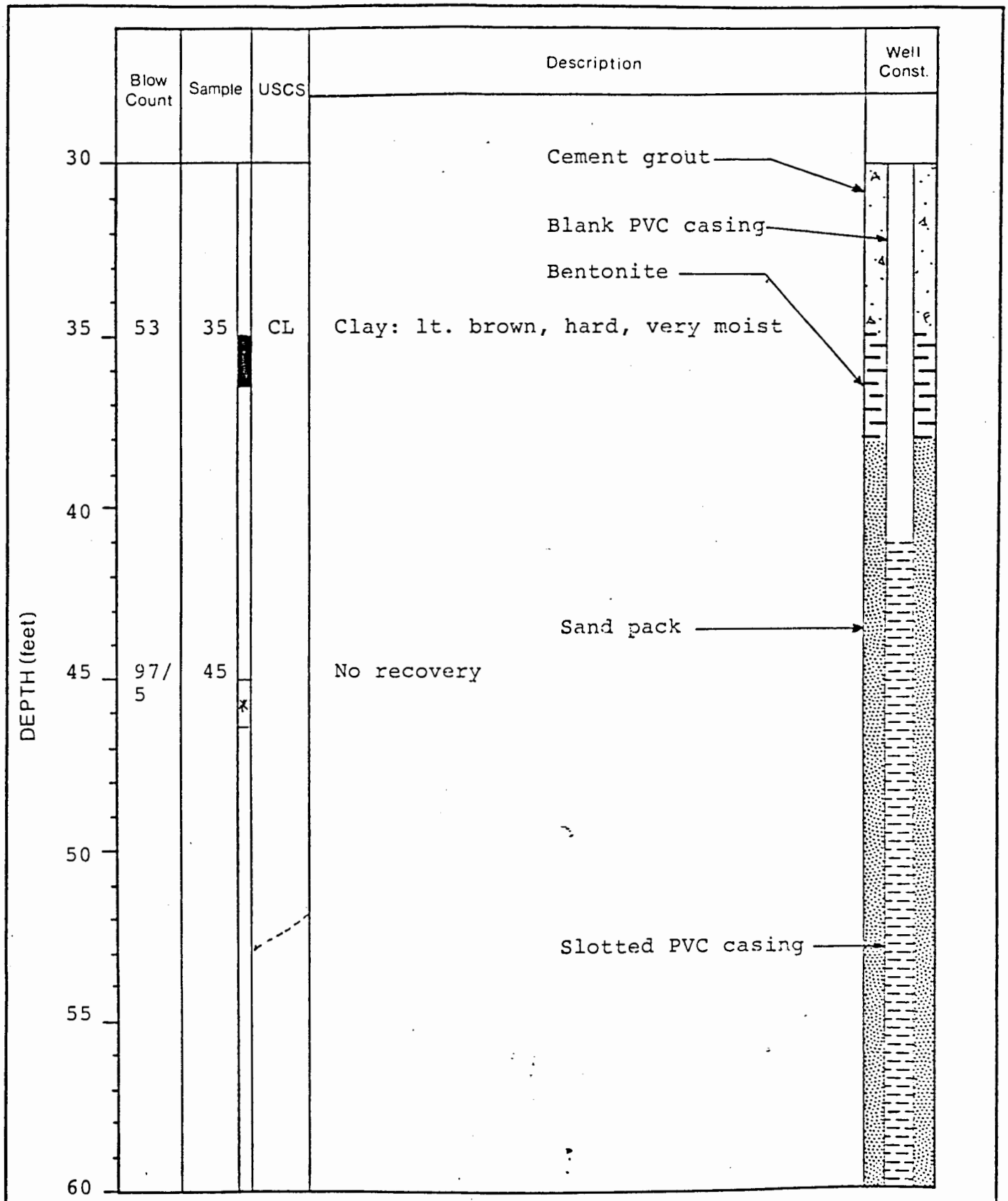
LOG of BORING MW-8

PLATE 14

PREPARED BY: DATE:

CHECKED BY: DATE:

PROJECT NO. 01014-2



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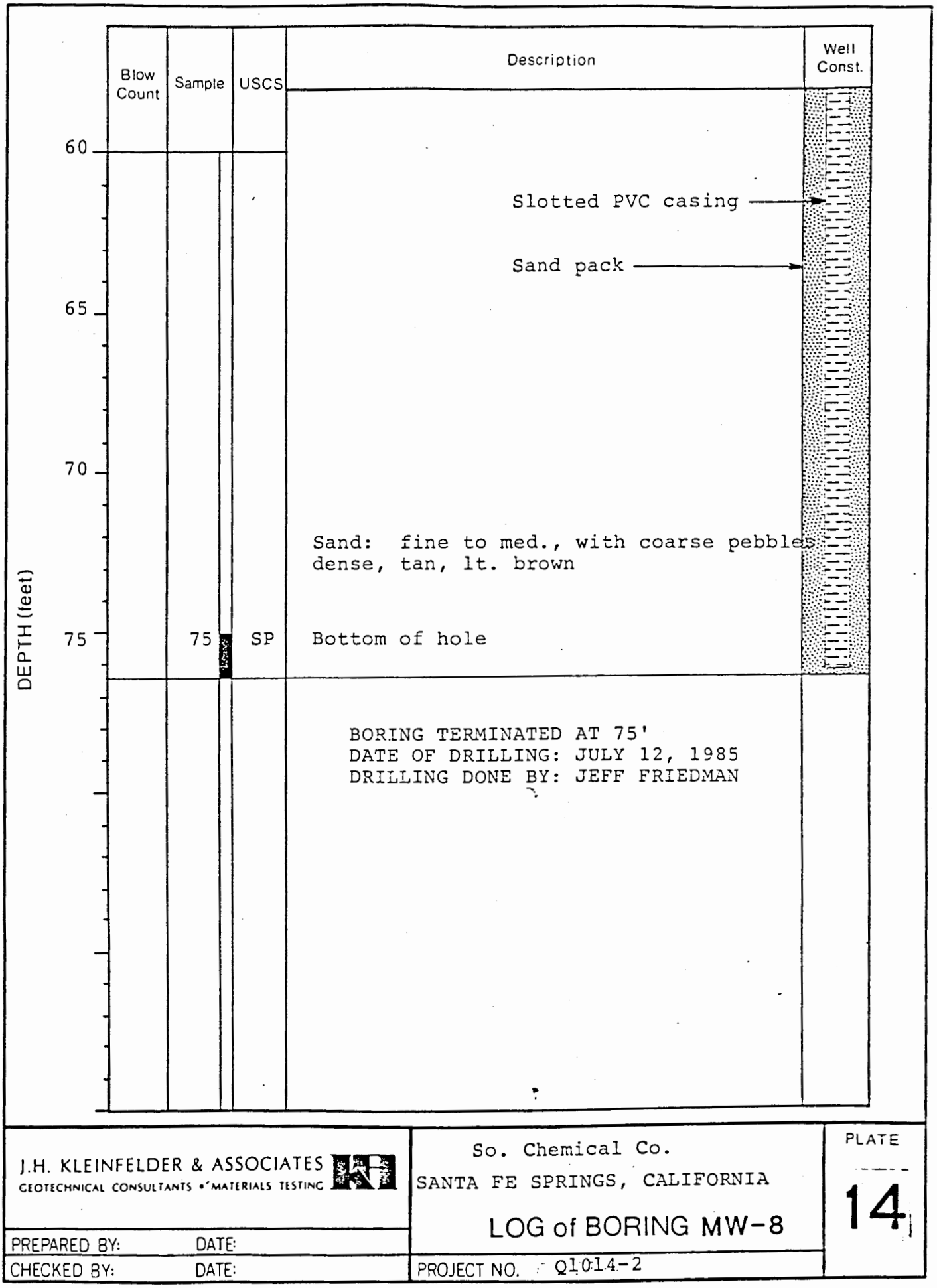
LOG of BORING MW-8

PLATE 14

PREPARED BY: DATE:

CHECKED BY: DATE:

PROJECT NO. Q1014-2



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LOG of BORING MW-8

PLATE 14

PREPARED BY: DATE:

CHECKED BY: DATE:

PROJECT NO. Q1014-2

DEPTH (feet)	Blow Count	Sample	USCS	Description	Well Const.
0				6" concrete	
				Locking well cap	
				PVC cap	
5	10	5	ML	Silt, silt with fine sand, black, soft, very moist	
				Cement grout	
10	30	10		No recovery	
				Blank PVC casing	
15	39	15	SP	Sand: fine sand with interbedded silt lens, tan-reddish, med. dense, moist	
20	68	20	SW	Sand: med. to coarse sand with pebbles up to ½", tan, very dense, damp	
25	99/4	25	SW	Sand: coarse sand with ground, grey pebbles up to 1". V. dense, moist	
30					

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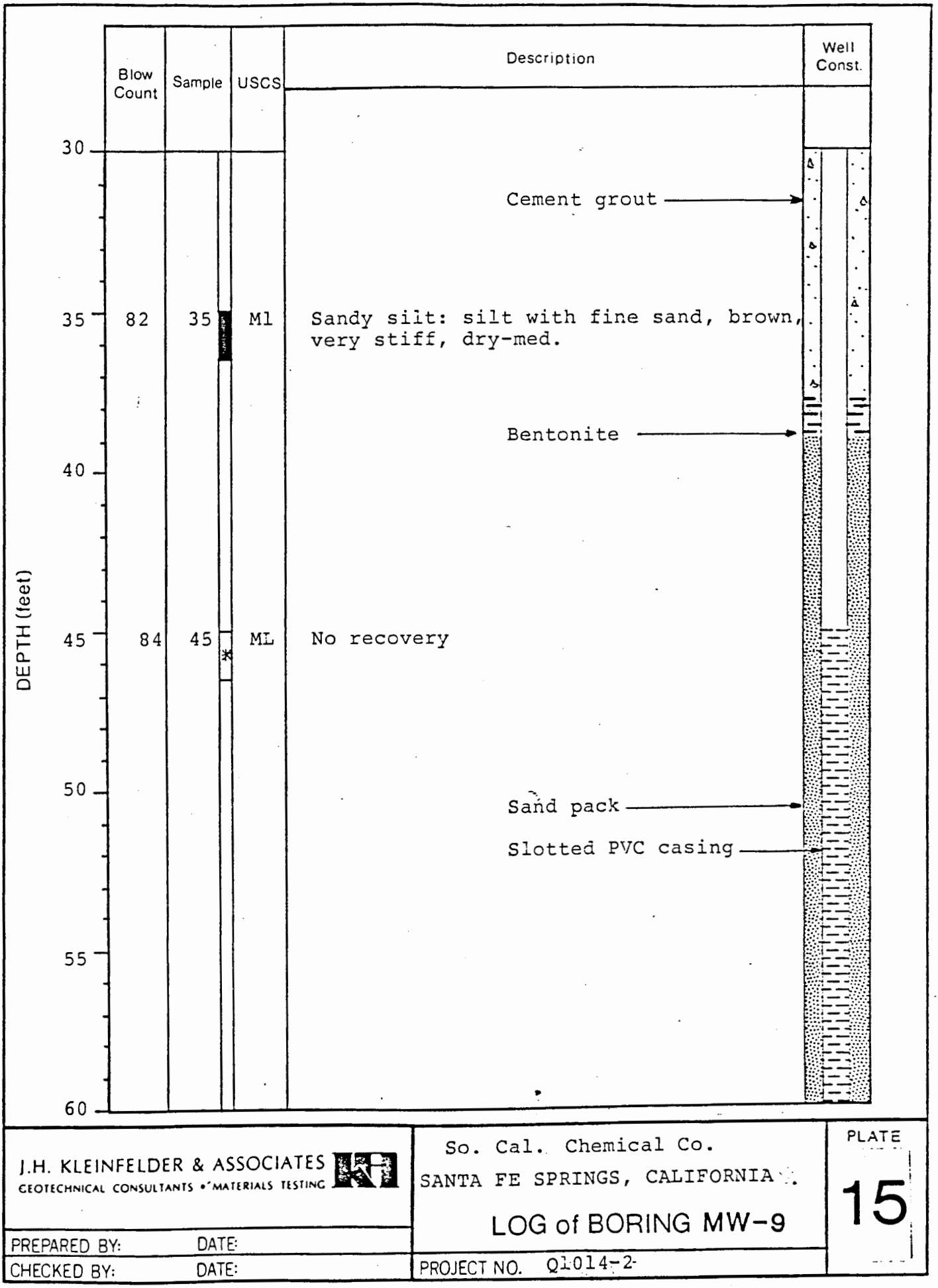
LOG of BORING MW-9

PLATE 15

PREPARED BY: DATE:
CHECKED BY: DATE:
PROJECT NO. 01014-2



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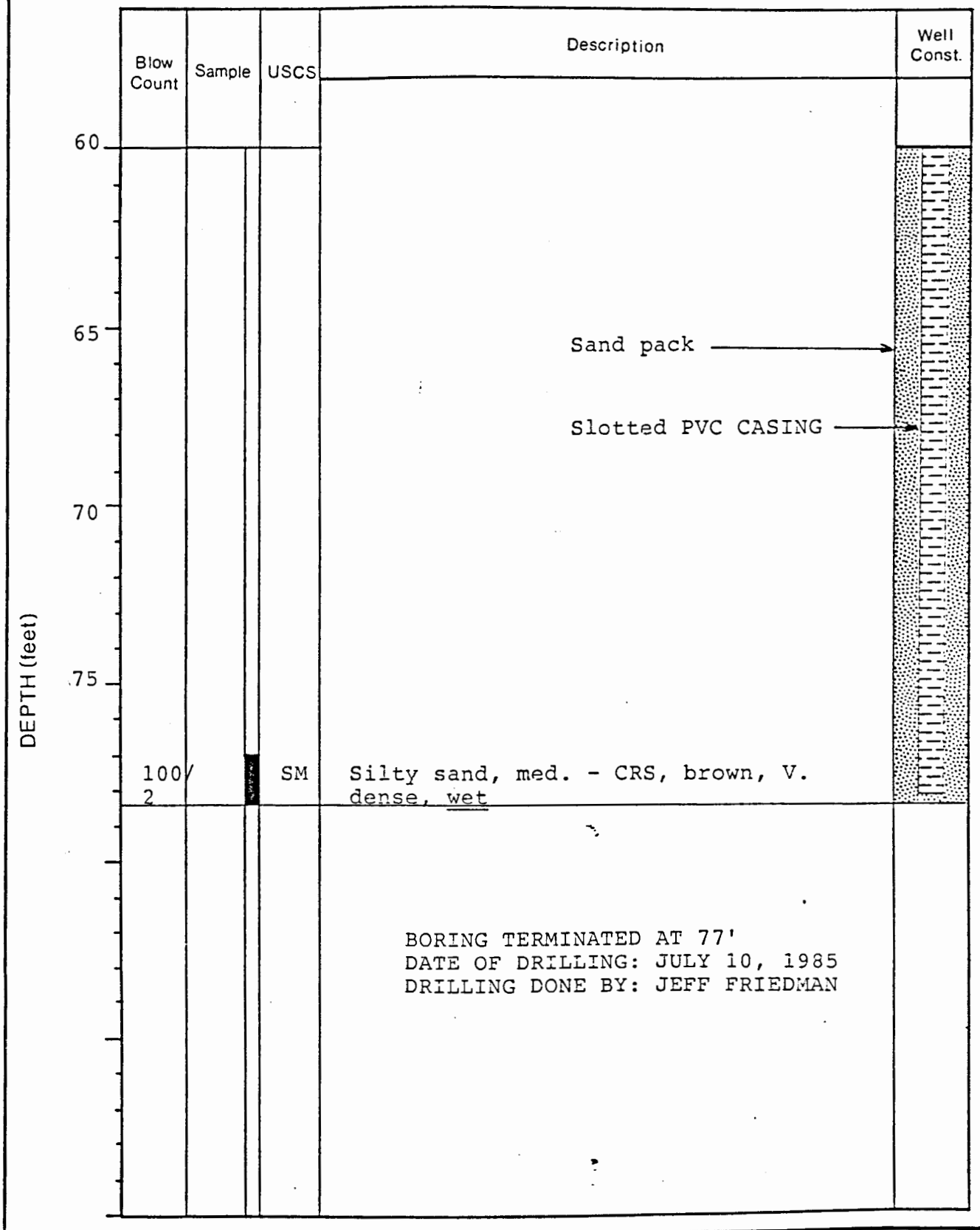
LOG of BORING MW-9

PLATE 15

PREPARED BY: DATE:

CHECKED BY: DATE:

PROJECT NO. 01014-2-



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LOG of BORING MW-9

PLATE 15

PREPARED BY: DATE:

CHECKED BY: DATE:

PROJECT NO. Q1014-2

Blow Count	Sample	USCS	Description	Well Const.
			6" concrete	locking well cap; PVC cap
				cement grout
14	7	ML	Sandy silt, black, med. dry	
				blank PVC casing
28	4	ML	Clayey silt, brown, med.stiff damp	
44	15	SP	Sand, med. to fine sand, brown, very dense, dry	
45	20	SP	Sand, fine to med. dense, dry	
90	25	SP	Sand, med. to fine, tan-hard, damp	

DEPTH (feet)

0 5 10 15 20 25 30

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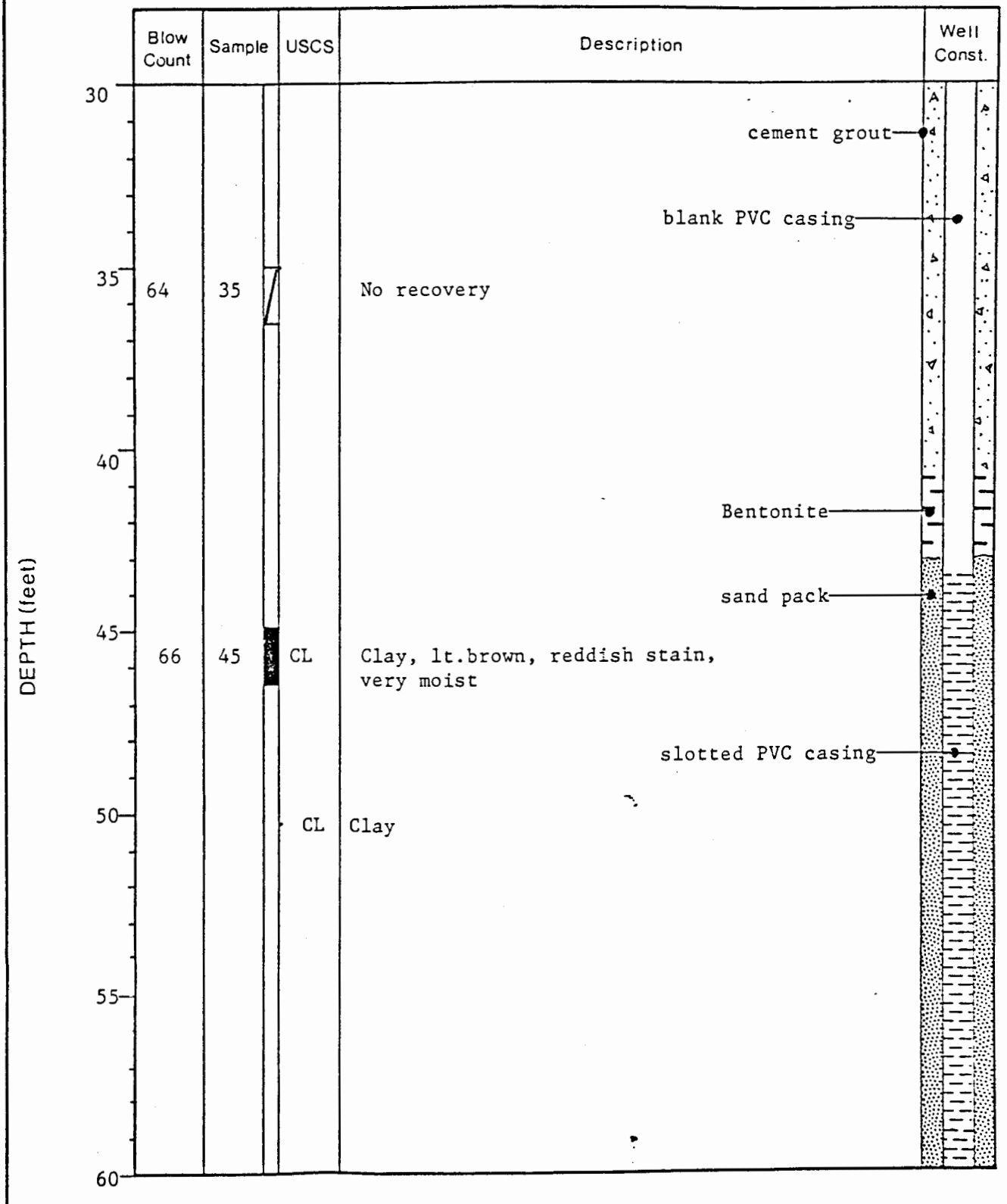
LOG of BORING MW-10

PLATE 16

PREPARED BY: GH DATE: 7-85

CHECKED BY: DATE:

PROJECT NO. Q1014-2



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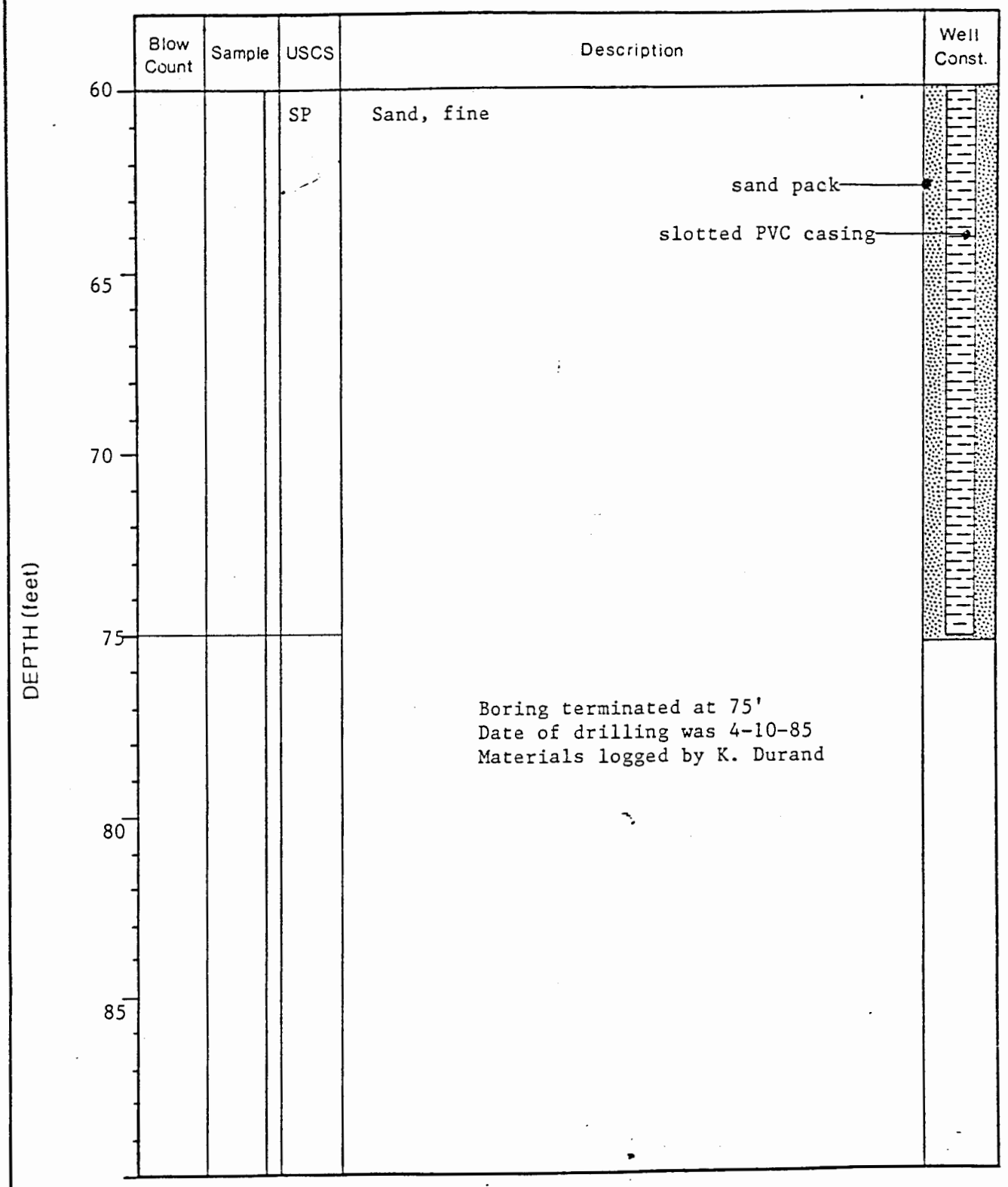
LOG of BORING MW-10

PLATE 16

PREPARED BY: GH DATE: 7-85

CHECKED BY: DATE:

PROJECT NO. Q1014-2



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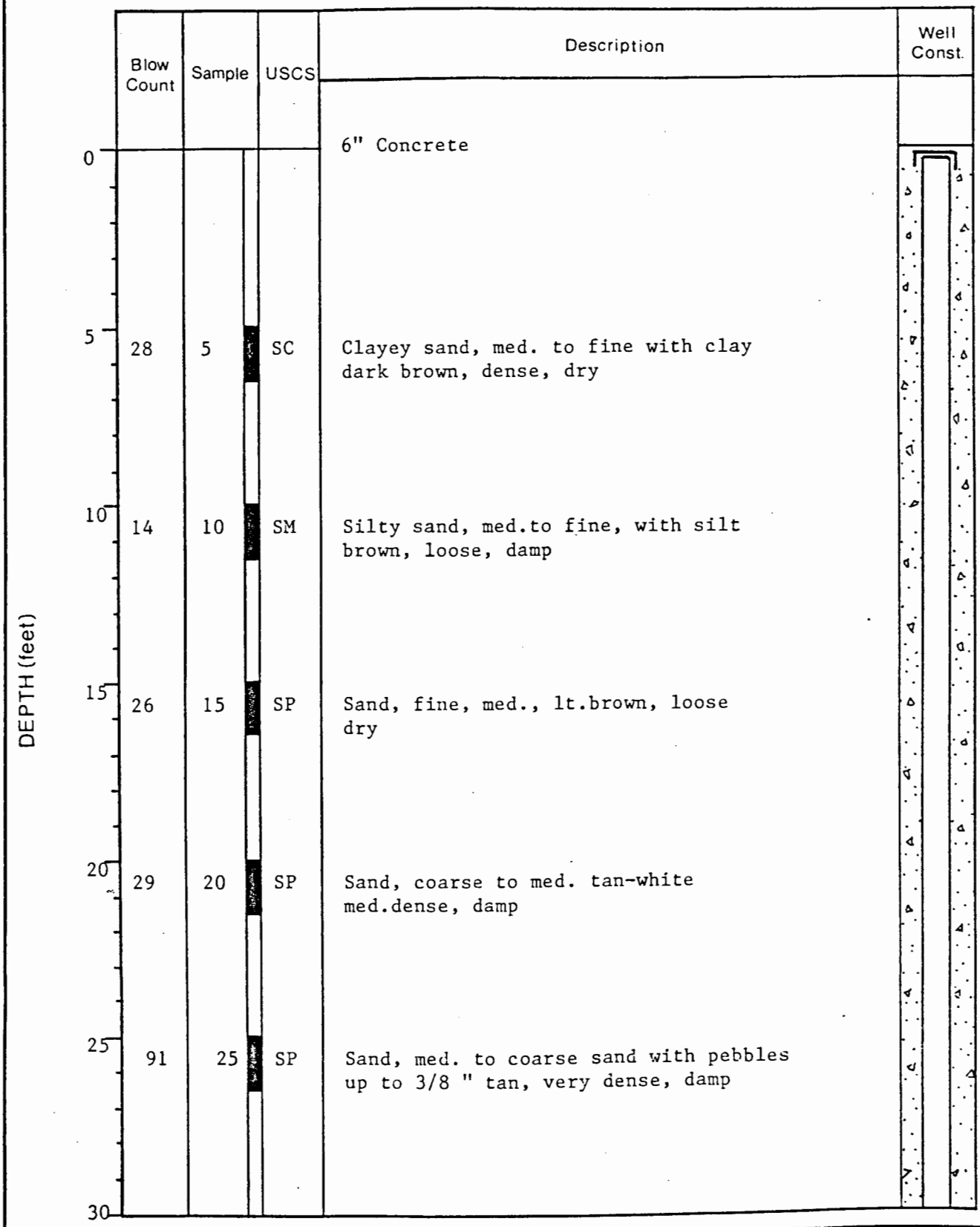
LOG of BORING MW-10

PLATE 16

PREPARED BY: GH DATE: 7-85

CHECKED BY: DATE:

PROJECT NO. 01014-2



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PREPARED BY: GH DATE: 7-85

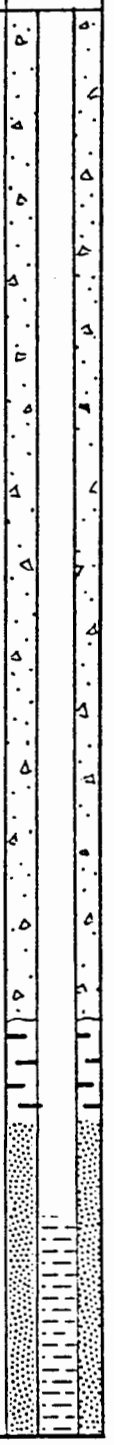
CHECKED BY: DATE:

LOG of BORING MW-11

PROJECT NO.

PLATE 17

DEPTH (feet)	Blow Count	Sample	USCS	Description	Well Const.
30					
35	64	35	ML	Sandy silt, silt with fine sand dark brown, very stiff, moist	
40					
45	49	45	ML CL	Silty clay, clayey silt, dense, very stiff, moist	
50					
55	41	55	CL	Clay, brown, saturated	
60					



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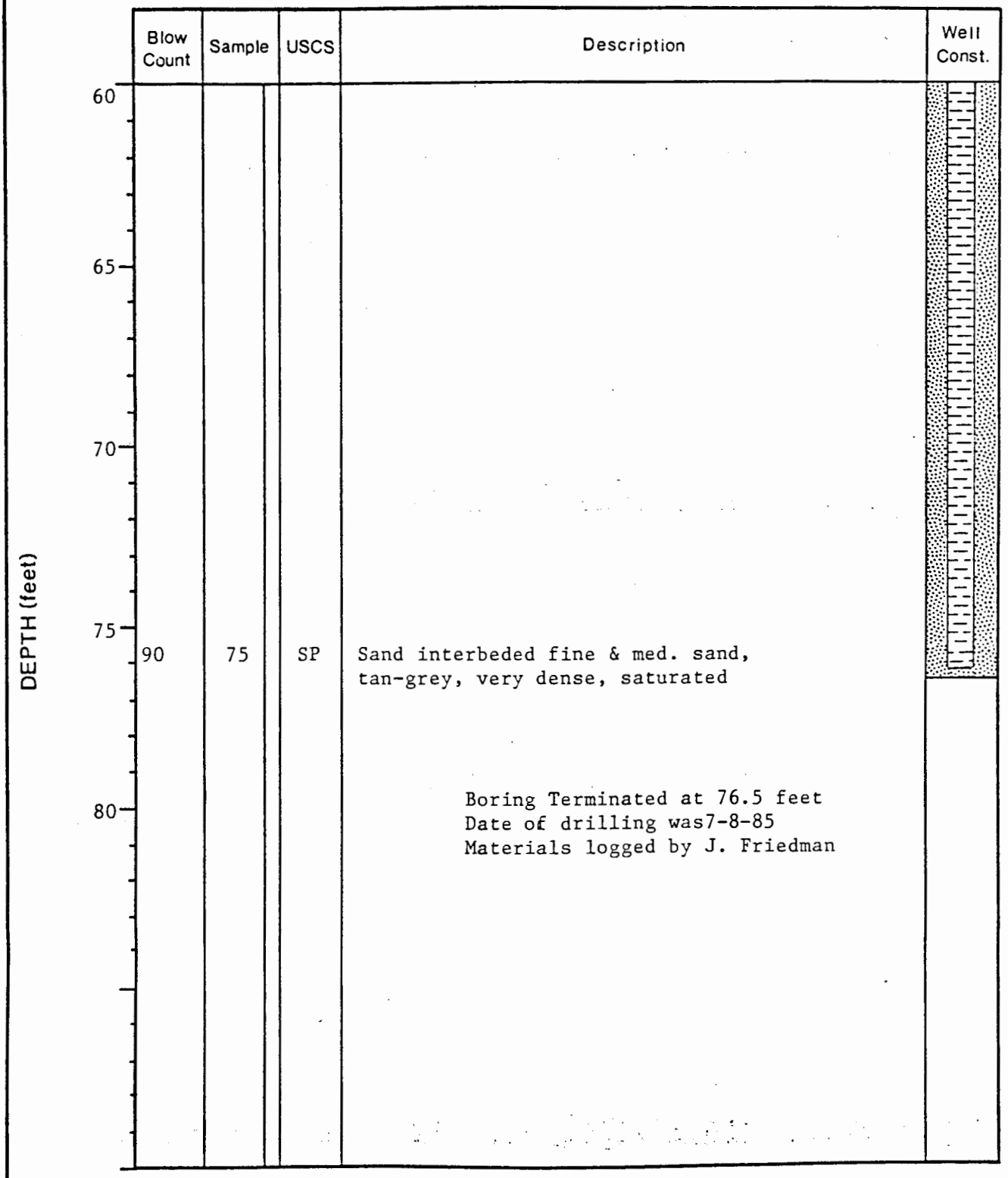
PREPARED BY: DATE:

CHECKED BY: DATE:

LOG of BORING MW-11

PROJECT NO.

PLATE 17



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PREPARED BY: GH DATE: 7-85

CHECKED BY: DATE:

LOG of BORING MW-11

PROJECT NO.

PLATE 17

DEPTH (feet)	Blow Count	Sample	USCS	Description	Well Const.
0			SM	4" concrete Silty sand, black, moist slant at 30	
5	9	5	ML	Silt, silt with fine sand, black medium, moist	
10	75	10	ML	Sandy silt, silt with fine sand brown, black-reddish, very stiff very moist	
15	52	15	SP	Sand, med. to fine sand brown, dense, damp	
20	20	99 +	SW	Sand, med to coarse, very little fines, tan, very dense, damp	
25					
30					

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LOG of BORING B-1

PLATE 18

PREPARED BY: GH DATE: 7-85

CHECKED BY: DATE:

PROJECT NO. Q1014-2

DEPTH (feet)	Blow Count	Sample	USCS	Description	Well Const.
30	80	30	SP	Sand med.to coarse sand tan, very dense, damp , only 3" sample	
35					
40	78		ML	sandy silt, silt with fine sand drk.brn, very stiff, moist	
45					
50	82	50	CL	Clay,very stiff, brown-green, wet	
55				Boring terminated at 50 feet Date of drilling was 7-9-85 Material logged by K. Durand	
60					

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LOG of BORING B-1

PLATE 18

PREPARED BY: GH DATE: 7-85

CHECKED BY: DATE:

PROJECT NO. Q1014-2

DEPTH (feet)	Blow Count	Sample	USCS	Description	Well Const.
0				6" concrete	
				Slant at 28°	
			SP	Sand, fine sand black, moist	
5	39	5	ML/CL	Silt/clay brown, very stiff, dry	
10	78	10	CL	clay, brown clay very stiff - hard, damp	
15	15	64	SP	Sand, med.sand, lt brown-tan very dense dry	
20	20	22	Sp	Sand, med. sand tan-red med. dense, dry	
25	25	76		no recovery	
30					

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LOG of BORING B-2

PLATE 19

PREPARED BY: GH DATE: 7-85

CHECKED BY: DATE:

PROJECT NO. Q1014-2

DEPTH (feet)	Blow Count	Sample	USCS	Description	Well Const.
30	99/3	30	SP	sand, med. to coarse sand lt.brown tan very dense dry	
			ML	Sandy silt, lt.brown-tan, very stiff moist	
35	68	10	ML	clayey silt, silt with clay, tan-reddish stiff damp	
40	96/4	40	CL	silty clay, very silty dark grey, moist	
				Boring Terminated at 40 feet Date of drilling was 7-9-85 Materials logged by K. Durand	
45					
50					
55					
60					

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PREPARED BY: GH DATE: 7-85

CHECKED BY: DATE:

So. Calif. Chemical

LOG of BORING B-2

PROJECT NO. Q1014-2

PLATE 19

DEPTH (feet)	Blow Count	Sample	USCS	Description	Well Const.
0				6" concrete	
			SM	Silty sand, fine sand & silt with pebbles up to 3/4", damp	
5	20	5	SM	Silty sand, fine sand and silt, med.dense damp, drk.brown	
10	41	10	SM	Silty sand, fine sand and silt dense, moist drk.brown	
15	52	15	SP	Sand, med. sand, tan,very dense,moist	
20				Boring terminated at 15'. Date of drilling was 7/8/85. Materials logged by K. Durand.	
25					
30					

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LOG of BORING B-3

PLATE 20

PREPARED BY: GH DATE: 7-85

CHECKED BY: DATE:

PROJECT NO. Q1014-2

DEPTH (feet)	Blow Count	Sample	USCS	Description	Well Const.
0			SP	6" concrete Sand, med. sand with pebbles up to 3/8" brown, dry	
5	33	5	ML	Silt with fine sand yellow stain, very stiff, dry	
10	54	10	ML	Silt with fine sand, yellow-brown, very stiff, dry-damp	
15	71+	15	ML	Silt with fine sand, brown, very stiff, damp	
20	100+	20	SP	Sand, med. to coarse sand with ½" rounded pebbles drk.brown-reddish very dense, damp	
25	97	25	SP	Sand coarse to med.sand tan-grey, very dense damp	
30					

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LOG of BORING B-4

PLATE 21

PREPARED BY: GH DATE: 7-85

CHECKED BY: DATE:

PROJECT NO. Q1014-2

DEPTH (feet)	Blow Count	Sample	USCS	Description	Well Const.
30	88	30	ML SP	Silt & Sand, brown very dense, damp	
				Boring terminated at 30 feet Date of drilling was 7-9-85 Materials logged by K. Durand	

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PREPARED BY: GH DATE: 7-85

CHECKED BY: DATE:

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LOG of BORING B-4

PROJECT NO. Q1014-2

PLATE 21

DEPTH (feet)	Blow Count	Sample	USCS	Description	Well Const.
0				6" concrete	
5	14	5	ML	Sandy silt: silt with fine sand, dark brown, med. stiff, moist	
10	20	10	ML	Sand silt, silt with fine sand and clay, brown-reddish, stiff, dry	
15	31	15	ML	Silt with clay, brown-reddish, stiff, damp	
20	91/4	20	SP	Med. to fine sand, grey-brown, very dense damp	
25	73	25	SW	gravelly sand, sand with pebbles up to 1½" dia. grey, hard, damp	
30					

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LOG of BORING B-5

PLATE 22

PREPARED BY: GH DATE: 7-85

CHECKED BY: DATE:

PROJECT NO. Q1014-2

DEPTH (feet)	Blow Count	Sample	USCS	Description	Well Const.
30	91/5	30	SW	Sand- med. to coarse sand, grey very dense, moist/wet	
				Boring Terminated at 30 feet Date of drilling was 7-12-85 Materials logged by K. Durand	

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PREPARED BY: GH DATE: 7-85

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LOG of BORING B-5

PROJECT NO. Q1014-2

PLATE 22

DEPTH (feet)	Blow Count	Sample	USCS	Description	Well Const.
0					
5	14	5	ML CL	Silt/clay, yellow, soft, moist	
10	40	10		No recovery	
15	41	15	SP	Sand, fine sand with silt, brown reddish, very dense, dry	
20	70	20	SP	Sand, med. to coarse sand red-brown very dense moist, very little fine	
25	93+	25	GP SW	Sandy gravel, gravely sand, rounded pebbles up to ½", very dense, damp	
30					

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LOG of BORING B-6

PLATE 23

PREPARED BY: GH DATE: 7-85

CHECKED BY: DATE:

PROJECT NO. Q1014-2

DEPTH (feet)	Blow Count	Sample	USCS	Description	Well Const.
30	57		ML	Sandy silt, silt with coarse sand very stiff moist, wet	
				Boring terminated at 30 feet Date of drilling was 7-9-85 Materials logged by K. Durand	

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PREPARED BY: GH DATE: 7-85

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LOG of BORING B-6

PROJECT NO. 01014-2

PLATE 23